

CONSTRUCTION METHODS

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TECHNOLOGY DEPT.:

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MASSED EQUIPMENT pushes road construction at important interchange for Detroit Industrial Expressway.

FEBRUARY
1943

Big Housing Project for Shipyard Workers • Michigan's New Expressway for War Industries Traffic • Airport Paving by Road-Mix Methods • Used Equipment Rebuilt for Hard Service

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NOTICE TO SUBSCRIBERS

Readers of Construction Methods will observe that the "trim size" of the current issue of the magazine is slightly smaller than that of previous numbers. The reduction in size has been made to enable the publishers to meet an order of the War Production Board limiting the amount of paper that may be used in 1943. Subscribers will note, however, that no change has been made in size of type, but that a substantial saving in paper has been effected merely by trimming the margins.

The publishers have adopted the new size as a war measure and as a contribution to the conservation of manpower and transportation facilities in the production and distribution of paper. Service to the reader has not been sacrificed and will be maintained so far as humanly possible in the face of the problems confronting all of us in our united efforts to win the war.

CURRENT JOBS ... and Who's Doing Them

BUILDINGS

Public—In Virginia, a battalion training camp is under construction by Doyle & Russell, of Richmond, for \$10,200,000. Low bidder for army building contract in Texas was A. Farnell Blair, of Decatur, Ga., with bid of \$5,000,000. Bid of \$4,720,000 obtained for Howard S. Wright & Associates, of Seattle, housing contract in Washington. Rust Engineering Co., of Pittsburgh, Pa., was awarded contract to construct industrial plant in Peru, South America, at estimated cost of \$4,000,000, to be financed by Defense Plant Corp. In Alabama, J. A. Jones Construction Co., of Charlotte, N. C., was awarded contract to build prefabricated frame emergency houses for \$3,000,000. Peterson & MacFadyen & Colin McGregor, of Little Rock, Ark., received army contract for buildings and water distribution system at Camp Robinson, Ark., to cost more than \$3,000,000. Housing project is under way in Georgia by Mion Construction Co., of Atlanta, at a cost of \$2,544,849. Successful bidder for housing contract in Virginia was Fred J. Brotherton, Inc., of Hackensack, N. J., with a low bid of \$2,868,900. Housing contract in California, to cost \$2,573,663, is under way by Robert McCarthy Co., of San Francisco. Rust Engineering Co., of Pittsburgh, Pa., will build an industrial plant in Ohio for \$2,500,000; Defense Plant Corp. will finance.

HEAVY CONSTRUCTION

Navy Department awarded contract for additional facilities at advance base depot in Rhode Island to George A. Fuller Co. and Merritt-Chapman & Scott Corp., of New York, N. Y., for \$18,478,000. Contract for improvements in Missouri went to Koss Construction Co., of Des Moines, Ia., at an estimated cost of \$2,000,000. In Washington, improvements are under way by Minnis & Moody, Johnson, Inc., and Vista Construction & Finance Co., of San Bernardino, Calif., with low bid of \$2,418,744. Contract for improvements in New Jersey went to Underpinning & Foundation Co., of New York, N. Y., for \$2,390,000 on cost-plus-fixed-fee basis. Paul Sterling Co., of New York, N. Y., was awarded contract for compass swinging base in Michigan, to cost less than \$1,000,000.

HIGHWAYS AND BRIDGES

Among recent highway and bridge contract awards are the following: Alabama \$295,551 to Ledbetter & Johnson Co., of Rome, Ga.; Georgia \$990,634 to Scott Construction Co., of Thomasville, Louisiana: \$847,922 to W. R. Aldrich & Co., Baton Rouge, Maryland: \$1,000,000 to C. J. Langenfelder & Son, of Rosedale and Union Building & Construction Co., of Passaic, N. J. New Jersey: \$221,868 to H. L. Harrison & Son, Inc., of Newark, Ohio: \$540,000 to Visintine & Co., of Columbus, Oklahoma: \$500,000-\$1,000,000 to Texas-Bitulithic Co., of Dallas, Tex. Texas: \$500,000 to Cage Bros. and Palmer & Winters, of Bishop; \$476,252 to L. H. Lacy Co., of Dallas, Utah: \$280,912 to Gibbons & Reed, of Salt Lake City; \$320,407 to C. E. Nelson, of Logan, Virginia: \$1,257,737 to W. H. Scott, Inc., of Franklin, \$334,968 to Bero Construction Corp., of Blackstone.

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FEBRUARY, 1943

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Construction Methods

A Pictorial Survey of Current Practice, Equipment and Materials

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The HOW of it

For the benefit of readers concerned with the practical application of method or equipment the following references are to articles or illustrations in this issue that tell:

- How **GLUED WOOD BEAMS** replaced critical steel for 67-ft. building span. —p. 39
- How **MASS HOUSING** for shipyard workers was provided on built-up site. —p. 42
- How **LUMBER WAS PRECUT** to exact dimensions at mill on mass housing project. —p. 42
- How **DIAGONAL BRACING** was placed to strengthen houses subject to earthquake stresses. —p. 44
- How **EMBANKMENTS WERE SODDED** as protection from erosion by heavy tropical rains. —p. 46
- How **WOOD FORMS** for concrete bridge piers were set by crane on pile foundations. —p. 47
- How **CONCRETE ROOF ARCHES** were built with aid of traveling forms. —p. 48
- How **PREFABRICATED TIMBER TRUSS** of 99-ft. span was raised by pair of crawler cranes. —p. 51
- How **DETROIT EXPRESSWAY** to serve war industries was built by twenty contractors. —p. 52
- How **PAVING MIXER** traveling on subgrade between forms placed concrete for roadway. —p. 53
- How **CLAY KNIFE** pulled by cable from dragline drum excavated pit for bridge pier footing. —p. 54
- How **USED CONSTRUCTION EQUIPMENT** is repaired and reconditioned by expert organization. —p. 57
- How **CRAWLER TRACKS** are disassembled for repair by air-powered impact wrench. —p. 59
- How **WORN CRANKSHAFT** of tractor is built up by metal spray gun. —p. 60
- How **CEMENT WAS SUPPLIED** to mixer on paving job by "jeep" rigged with hopper. —p. 62
- How **ABANDONED RAILS** in city streets are reclaimed for use as scrap by special machine. —p. 63
- How **FIELD LUBRICATION** of construction machinery is done with air-powered equipment on truck. —p. 63
- How **ROAD-MIXER TRAIN** prepared bituminous surfacing for airport runways. —p. 67
- How **PILE FOUNDATION** for bank building addition was built in close quarters. —p. 68

Mining—Number One War Industry

The mineral products of the earth are the prime necessities of war...and peace

THE SURFACE of the earth provided primitive man with the things he needed for his meager existence but civilization really began when he became curious about its interior. This curiosity has brought us a long way. For the earth has yielded—out of its deep recesses—all the raw materials of modern industry. And today, in the grueling race of production, our mining industry is providing the raw materials upon which depends our survival. Our mines and quarries must supply a long list of materials without which a successful war cannot be fought.

Take steel, for example. War without steel is inconceivable. Steel starts with iron ore, limestone and coke. These are products of mines and quarries. It takes power and heat to get these materials out of the ground, to refine them and to transport them to the point where processing begins. All the subsequent operations culminating in the steel ingot, shape or plate, and in moving the final product to the point of use require power and heat.

The major source of this power and heat is coal.

Production of a ton of steel, it has been stated, requires two tons of coal. Smelting of the pig iron alone, 60,000,000 tons in 1942, required the coking of some 75,000,000 tons of coal. Pig output is expected to rise to 68,000,000-70,000,000 tons in 1943, carrying coal consumption up to 85,000,000 tons. At the same time, output of steel ingots is expected to rise from 87,000,000 to 97,000,000 tons. Think what this means in terms of power and heat.

Another vital metal is copper. Modern armies need copper. This point is dramatically illustrated in a recent memorandum by Robert P. Patterson, Under Secretary of War, in announcing the release of 4,000 men from military service to return to the mines and increase copper production. "In a single minute of combat", Mr. Patterson declared, "a flight of 50 fighter planes shoots away 7 tons of copper. A 37-mm. anti-aircraft gun uses up a ton of copper every twenty minutes it is in operation. Six hundred pounds of copper go into every medium tank, and a ton into the engines and airframe of a Flying Fortress. The Signal Corps alone needs 5,000 tons of copper every month for radio and telegraphic and telephonic equipment. An army without copper would be an army without speed, maneuverability or fire-power. It would not last a day in battle."

Seven tons of copper for one minute of combat by 50 fighter planes means from 200 to 700 tons of ore, depending upon its grade. Small wonder that the War Department was willing to release drafted miners from military duties to produce more copper.

But other metals are equally important in war: tungsten, nickel, manganese, chromium, vanadium and molybdenum for alloy steels; zinc for brass and die castings; tin for bronze and bearings; aluminum and magnesium for aircraft; lead and mercury for ammunition; silver for electrical equipment, bearings and solder, and so on. Even relatively insignificant non-metallics, like mica and

diamonds, suddenly assume critical importance.

And let us not lose sight of the fact that without adequate energy, i.e., heat and power, production, processing, transportation and the relative comforts to which we have become accustomed would be impossible under war conditions. Coal is the major source of energy in the United States. It supplies more than half the total in normal years.

The railroads of the country alone used 110,000,000 tons in 1942 to move freight and passengers and service their facilities. Utilities consumed over 68,000,000 tons in the production of electric power. Over 135,000,000 tons of coal were consumed last year in maintaining the level of heating comfort necessary for the maintenance of efficiency and morale. The consumption, this year, will be even greater.

In short, the mineral products of the earth are the prime necessities of war.

The nations that control the world's mineral resources and make the most efficient use of them will win the victory.

Before the war, the British Empire and the United States together controlled probably 75 per cent of the world's mineral production. This would have been a most potent weapon in the United Nations' arsenal if the whole strategy of Axis expansion had not been influenced by mineral objectives. Addressing the American Zinc Institute on the subject last April, E. W. Pehrson, of the U. S. Bureau of Mines, estimated that the Axis had improved its position in world mineral resources in the following percentages: iron ore, from 6 to 46; steel production capacity, 20 to 34; petroleum, 1 to 7; coal, 27 to 53; copper, 5 to 10; lead, 7 to 22; zinc, 16 to 27; tin, 1 to 72; manganese, 2 to 30; chrome, 3 to 30; tungsten, 6 to 60. In the light metals, areas now Axis-controlled produced in 1940 54 per cent of the world's aluminum, 49 per cent of the bauxite (the principal source of aluminum) and two-thirds of the magnesium.

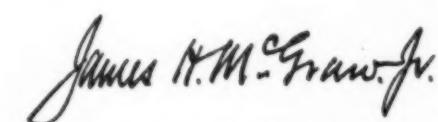
Despite these gains, the industrial war power of the United Nations still can outweigh that of the Axis by a considerable margin. It already has

begun to surpass it. The problem is to convert quickly our potential mineral resources into implements of war. In this conversion, a heavy burden of responsibility has been placed on the mining industry of the United States as the largest producer of many metals, minerals and fuels. In fact, the United States mining industry began to go on a war basis a year before Pearl Harbor. The curves of demand for domestic copper, lead, zinc and other metals began to rise sharply in 1940, and were paralleled by a rising coal production.

How well the job has been done cannot be revealed in accurate figures in many cases because of censorship. In metals, however, some idea of production gains can be indicated in comparative terms. United States copper production, for example, is breaking all previous records. Aluminum capacity will be more than seven times its annual peace-time average. Magnesium plants now building will have a capacity 100 times the largest yearly before-the-war figure. Molybdenum, of which the United States has the largest single mine in the world, is being made available in record quantity. Zinc, lead and mercury are surpassing expectations in meeting wartime demands, and tungsten, chromium, manganese, antimony and iron and steel are being turned out in record-breaking quantities.

Bituminous coal production in 1942 was 580,000,000 tons, the greatest in history, valued at more than \$1,300,000,000 at the mine. Some 430,000 or more men were employed in 1942 and received at least \$750,000,000 in wages. Bituminous production in 1939 was 394,855,000 tons, while the output for 1943 is forecast at approximately 600,000,000 tons—another new United States record. The 1942 anthracite output was 59,961,000 tons, valued at over \$270,000,000 at the mine. The industry employed some 85,000 men and paid out at least \$180,000,000 in wages. The 1939 production of anthracite was 51,487,000 tons, and the forecast for 1943 is 65,000,000 tons or more.

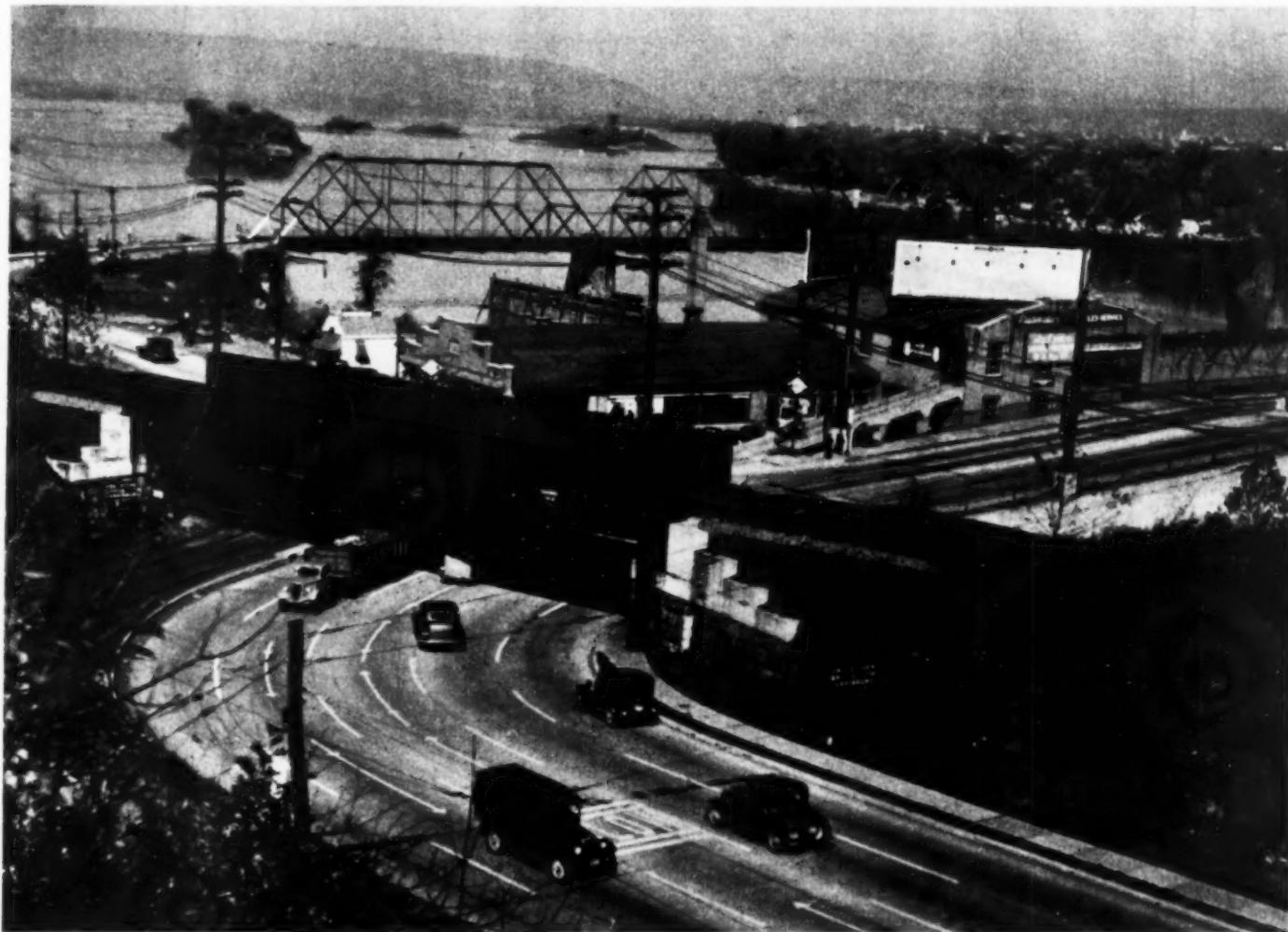
Marshalling the Western Hemisphere's mineral resources, the United Nations have been the beneficiaries of the diversified resources of two continents—in particular of Canada's nickel and coal, Mexico's lead and antimony, Chile's copper, Bolivia's tin, Peru's vanadium, Brazil's iron, and Venezuela's petroleum. With other United Nations contributing their share of metals and fuel, the grand total is an impressive array of potential munitions and matériel to lend assurance of certain victory over the Axis. Sheer weight of metal, properly used, will win the war, and our mineral industry will have played an indispensable and essential part in the inevitable outcome.



President, McGraw-Hill Publishing Company, Inc.

This is the eighth of a series of editorials appearing monthly in all McGraw-Hill publications, reaching more than one and one-half million readers, and in daily newspapers in New York, Chicago and Washington, D. C. They are dedicated to the purpose of telling the part that each industry is playing in the war effort and of informing the public on the magnificent war-production accomplishments of America's industries.

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1. Be sure to completely disengage the clutch before starting to shift gears, and complete each shift before re-engaging the clutch.

2. Keep the transmission in a gear low enough to prevent overloading of the engine.
3. Under tough hauling conditions, start in first speed of the low range.
4. Select the proper gear for hauling up grade before reaching the steepest part of the grade.
5. Stop the unit when shifting the transmission from low to high range, or from high to low range.

Complete operation and maintenance instructions for the transmissions in all EUCLIDS are contained in Page 16 of the Euclid Instruction Manual. If you need an extra copy of this page, write our Service Department for Form INS-214.

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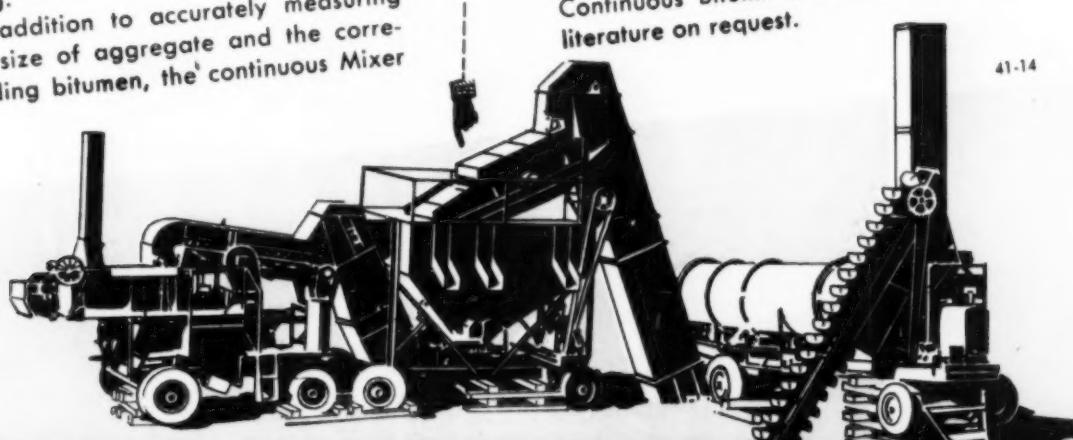
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Here's the Unit
for Keeping Airport Runways
and Highways in Shape

*



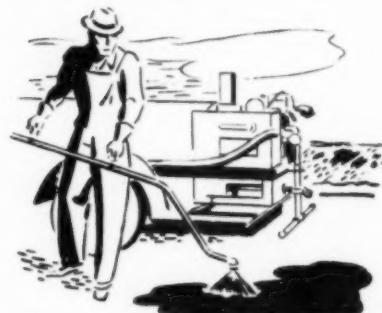
The Littleford Model No. 101 Utility Spray Tank is the versatile Bitumen Spraying Unit for keeping highways and runways in shape.

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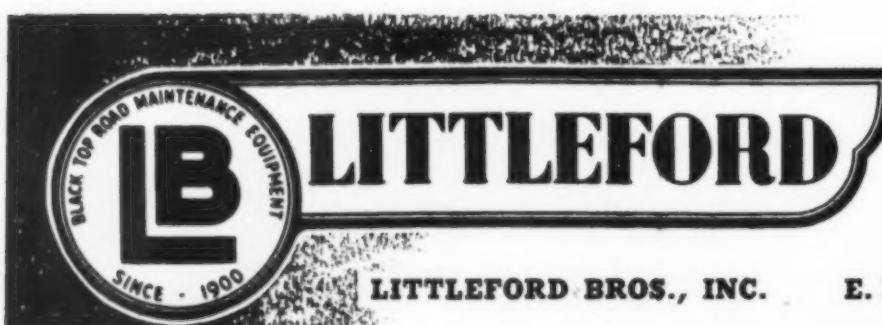
Pouring Pot Outlet makes it possible to do crack filling work.



Hand Spray Attachment makes patch work easy.



Spray Bar makes small application jobs, such as shoulder widening, a simple task.



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FOR VICTORY

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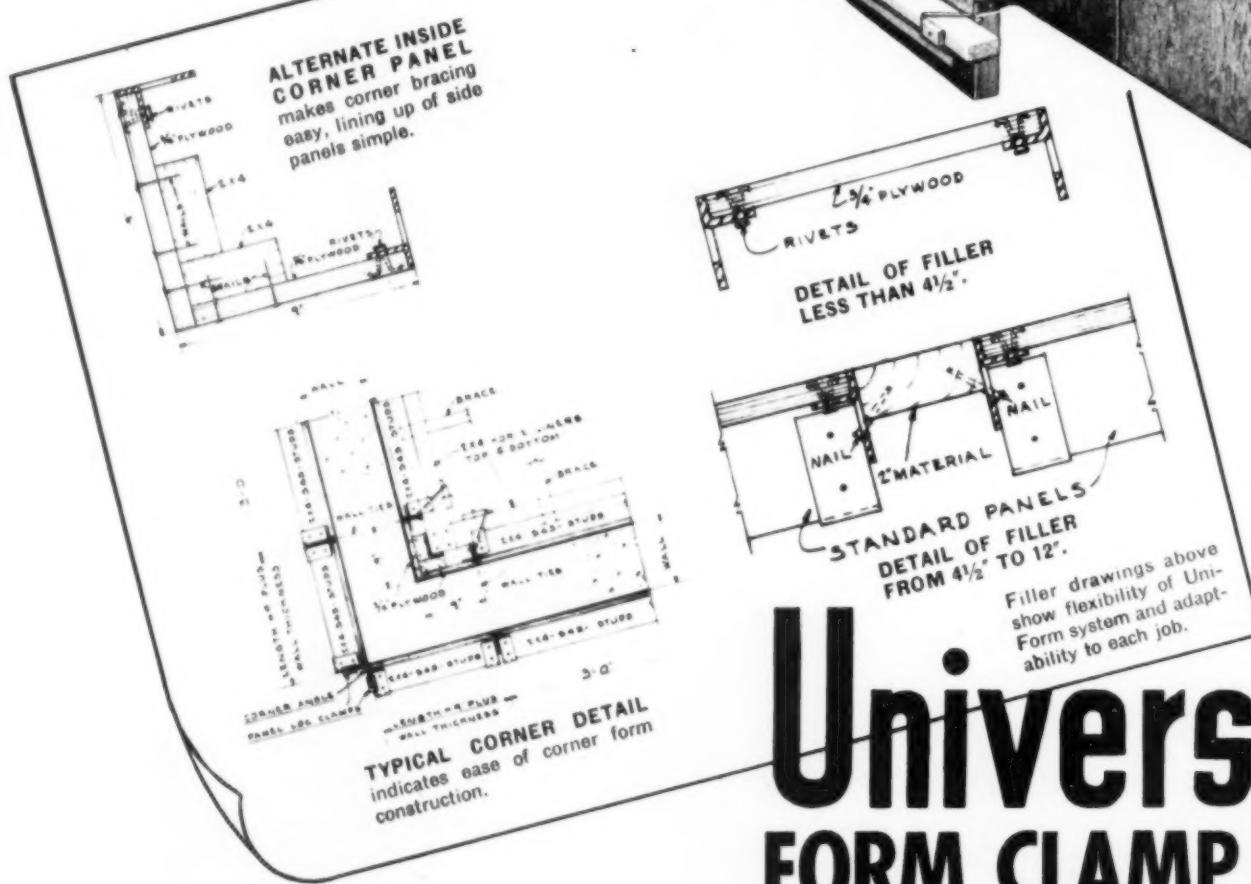
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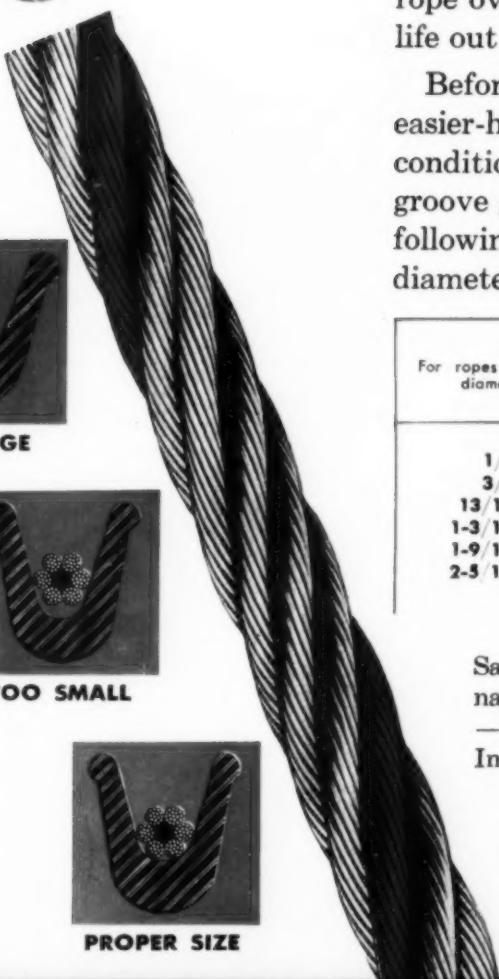
A Sheave Like This
Will Ruin
Wire Rope

Yes, Even...

HAZARD

LAY-SET

Preformed



Never install a new wire rope on a worn sheave—to do so invites early failure. When the groove gets too wide, it permits the rope to flatten. . . . And don't try to run a new rope over a groove that is too narrow. That pinches the life out of it.

Before installing a wire rope (even the longer-wearing, easier-handling **Hazard LAY-SET Preformed**) carefully check the condition of your sheaves, using the standard sheave groove gauge. For calculating safe groove diameters, the following table gives the exact extent by which the groove diameter should exceed the diameter of the rope:

For ropes of the following diameters in inches	Groove diameter should be greater than rope by not less than the following fraction of an inch	Groove diameter should be greater than rope by not more than the following fraction of an inch
1/4 to 5/16	1 64	1 32
3/8 to 3/4	1 32	1 16
13/16 to 1-1/8	3/64	3 32
1-3/16 to 1-1/2	1/16	1/8
1-9/16 to 2-1/4	3 32	3 16
2-5/16 and larger	1/8	1/4

Save critical steel by careful inspection and proper maintenance of *all* equipment and by using **Hazard LAY-SET Preformed**—the greater dollar value rope. All Hazard ropes made of Improved Plow Steel are identified by the Green Strand.

HAZARD WIRE ROPE DIVISION

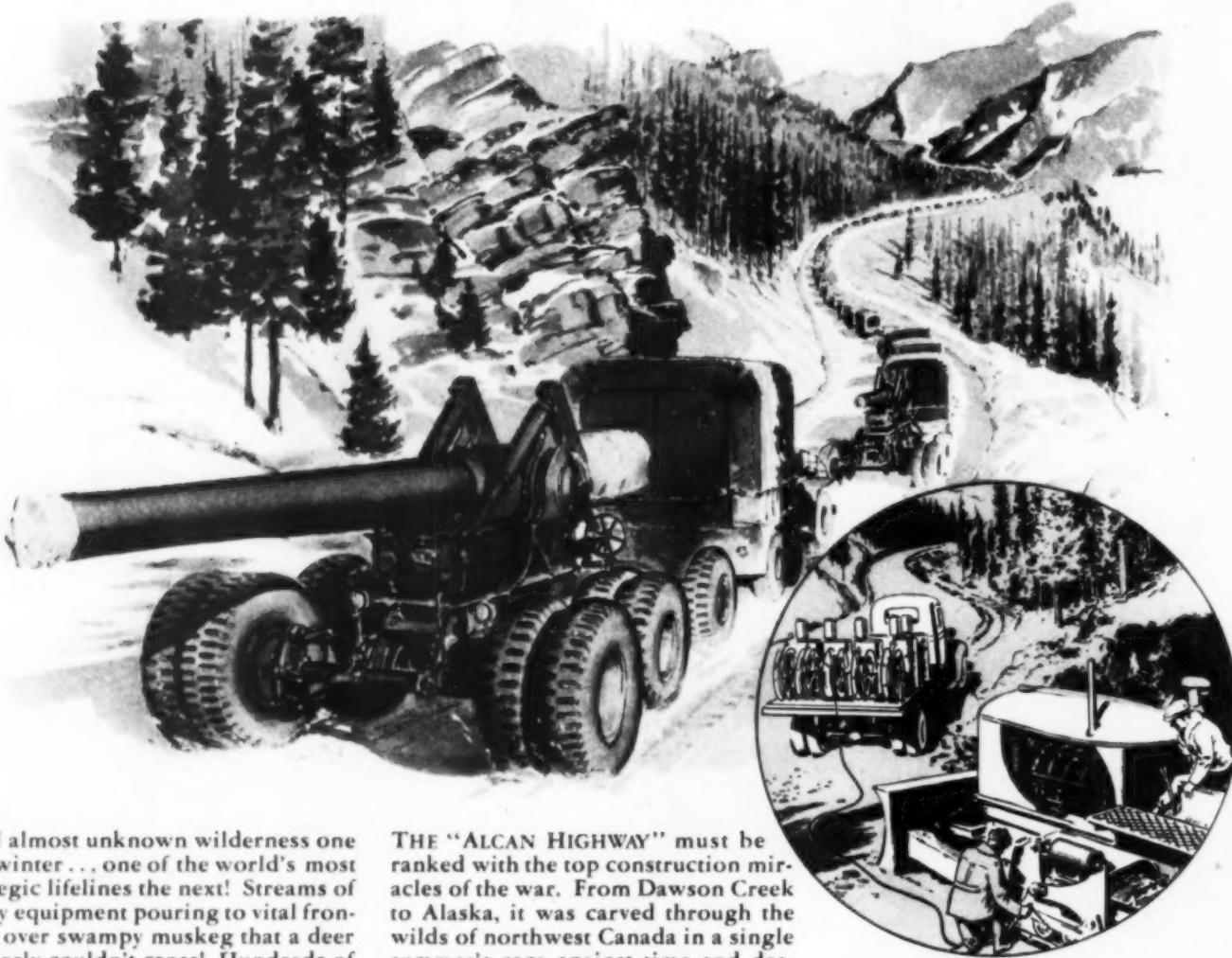
Wilkes-Barre, Pa., Atlanta, Chicago, Denver, Fort Worth, Los Angeles
New York, Philadelphia, Pittsburgh, San Francisco, Tacoma

AMERICAN CHAIN & CABLE COMPANY, INC.
BRIDGEPORT, CONNECTICUT

HAZARD LAY-SET Preformed WIRE ROPE

The BIG GUNS ARE MOVING

on "the Lifeline that Couldn't Be Built"...



An almost unknown wilderness one winter... one of the world's most strategic lifelines the next! Streams of heavy equipment pouring to vital frontiers over swampy muskeg that a deer formerly couldn't cross! Hundreds of miles of rock and dust and grit and water—tamed in months instead of the years it would normally take!



Alemite *Industrial Lubrication*
Alemite Portable Service Station

ON COUNTLESS construction jobs, large and small, Alemite Portable Service Stations *on the job* have paid for themselves in days—in time saved on lubrication of equipment. Less "time out" for lubrication means more time for moving dirt each day—more yards moved every day at a definite per-day cost.

What's equally important, the Alemite Portable Service Station *on the job* means that every machine is getting the kind of protection the

THE "ALCAN HIGHWAY" must be ranked with the top construction miracles of the war. From Dawson Creek to Alaska, it was carved through the wilds of northwest Canada in a single summer's race against time and destiny—to shorten our supply route to Alaska from weeks to days. Heavy machinery, flown to airports hand-hewn in the wilderness, thundered where only animal noises had been heard before. And before the last leaves fell, the "lifeline that couldn't be built" shook under the treads of guns and tanks on their way to our farthest-north frontier.

AS USUAL, where the going is tough and machine breakdowns must be avoided, Alemite went along to help build the "Alcan Highway". On bull-dozers, graders, tractors that had to work three shifts a day *or else*—Alemite Lubrication Systems stood guard against wear. And Alemite Portable Service Stations developed for this job fed those Alemite Systems the special lubricants each part required.

ALEMITE

REG. U. S. PAT. OFF.
Industrial Lubrication

1840 Diversey Parkway, Chicago, Ill. • Belleville, Ontario

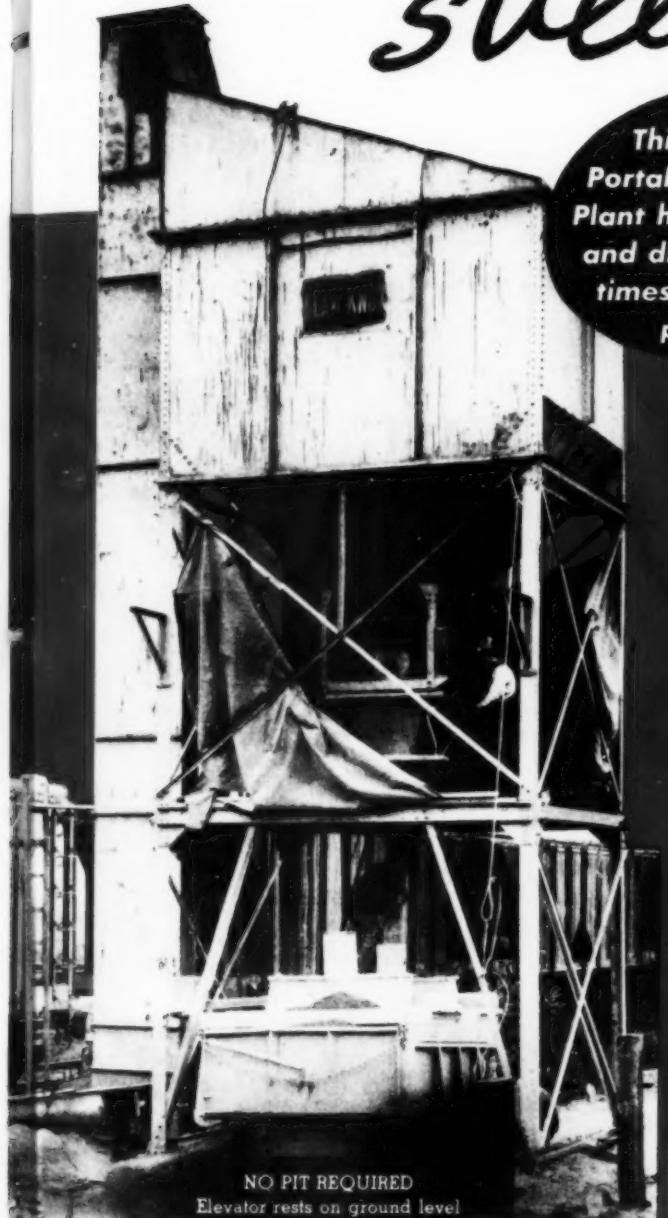
manufacturer intended. Protection against friction—against dust penetration and undue wear—means longer life for every machine!

Write today for your FREE copy of the new Catalog of "Alemite Portable Service Stations", showing various set-ups available, and the many ways in which they can speed operations for you. This book is just off the press. It's crowded with photographs and facts. Send for your copy NOW!



IN CONSTANT SERVICE SINCE '37
MOVED FIVE TIMES AND

still trouble free!



This Blaw-Knox
Portable Bulk Cement
Plant has been erected
and dismantled five
times, on as many
projects

NO PIT REQUIRED
Elevator rests on ground level

Guy Hamm, Plant Superintendent for Thomas McQueen, Forest Park, Illinois, engineers and contractors, has poured hundreds of thousands of square yards of concrete paving with this bulk cement plant. He says—"In five separate locations we've used this plant with convenience, speed, and maximum dependability!"

Trouble-free because...

CEMENT GATE VALVES are made of machined castings, will not leak or jam.

WEIGHING SCALES are of the precision type. They show when the batcher is full or empty.

BIN SLOPES are steep and smooth for fast flow of the cement.

STURDY CONSTRUCTION permits repeated dismantling and re-erection.

BEST QUALITY conveyors and power drives.

Ask your nearest Blaw-Knox Distributor to tell you about this remarkable Bulk Cement Plant.

BLAW-KNOX DIVISION
of Blaw-Knox Company

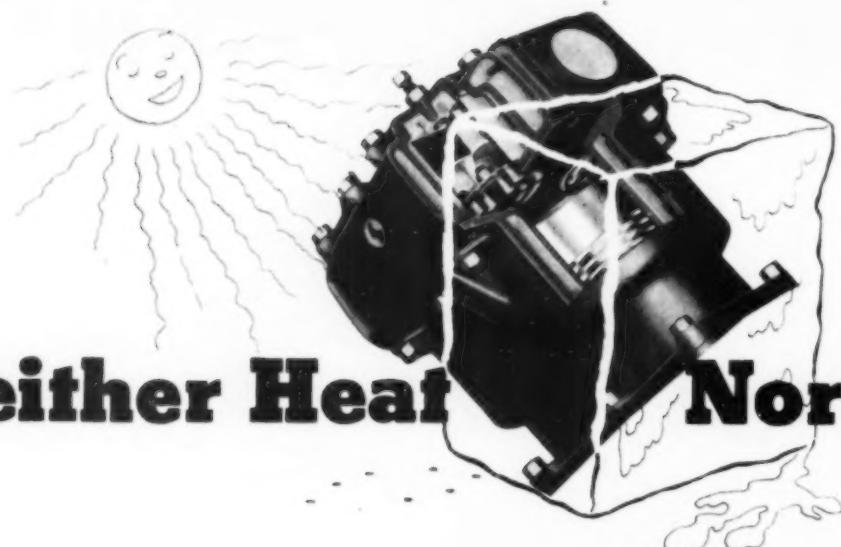
2086 FARMERS BANK BUILDING
PITTSBURGH, PA.

NEW YORK CHICAGO PHILADELPHIA
BIRMINGHAM WASHINGTON

REPRESENTATIVES IN PRINCIPAL CITIES

BLAW-KNOX
BULK CEMENT PLANTS

CONCRETE SPREADERS • ROAD FORMS • TRUCK MIXERS • CONCRETE FINISHING MACHINES
CLAMSHELL BUCKETS • BINS AND BATCHERS • CONCRETE BUCKETS • STEEL STREET FORMS
BULK CEMENT PLANTS • CENTRAL MIXING PLANTS • TRUCK TURNTABLES • TAMPING ROLLERS



Neither Heat Nor Cold . . .

Neither heat nor cold—nor severe weather conditions—nor extremes of altitude make any difference in the dependability of Gardner-Denver Water-Cooled

Portables. They keep on delivering full air output day after day, month after month. Cutaway view of water jacket completely surrounding cylinder and head shows why.



Blistering Summer Throughout the "Death Valley" days of summer, your Gardner-Denver Water-Cooled Portable Compressor will show lower discharge temperatures from both the low and high pressure cylinders, as well as from the air receiver. (Here a Gardner-Denver Diesel Portable supplies air for powerful Gardner-Denver S-55 Sinkers.)



Frigid Winter In severely cold weather, warm water from the engine may be circulated through the compressor jacket, thoroughly warming the compressor before the clutch is thrown in. With the compressor "warmed up," oil will flow to the vital parts at once. (Note the heavy-duty Gardner-Denver S-73 Sinker.)



High Altitude Whether your job calls for operating at high altitudes or low—you'll find your Gardner-Denver Water-Cooled Portable Air Compressor delivering the same dependable performance. You'll find they run cooler at any altitude—and use less lubricating oil. (The sinking drill is the famous Gardner-Denver S-55.)



Grueling Service When the job calls for three-shift-a-day operation, you'll learn how a Gardner-Denver Water-Cooled Portable Compressor will deliver full air output through the hours—without coddling or pampering. (On this project, Gardner-Denver Portables furnish plenty of air for operating a fleet of Gardner-Denver UM-99 Wagon Drills.)

For a bulletin describing the full line of Gardner-Denver Water-Cooled Portable Compressors, write Gardner-Denver Company, Quincy, Illinois.

GARDNER-DENVER Since 1859



A Good Shot In Your Quarry



Is a Shot Against the Axis

Atlas "Better Blasting" Speeds Production . . . Saves Equipment!

Make every shot count with the right use of the right Atlas explosive.

Wartime production puts ever-growing demands on equipment. Inevitably, repair costs rise. But—these costs can be controlled and held to a minimum.

The key is "better blasting"—the right explosive used in the right way.

Proper and uniform shattering of rock permits a full dipper load. Poorly shattered material means only partly filled dippers, with lower returns and higher maintenance costs.

Call on the Atlas representative to help you find the best solution of your blasting problems.

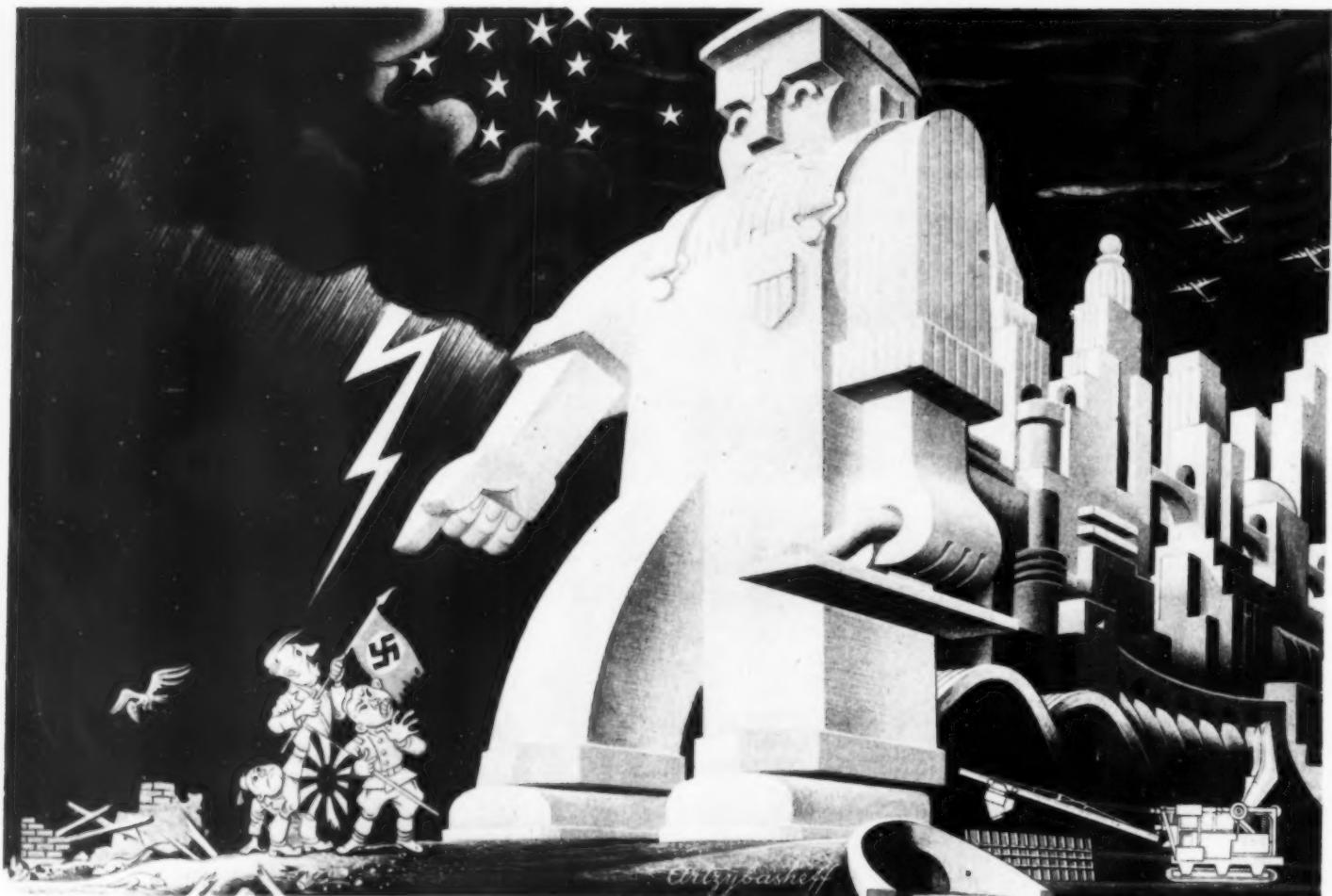
ATLAS

EXPLOSIVES

"Everything for Blasting"



ATLAS POWDER COMPANY, Wilmington, Del. • Offices in principal cities • Cable Address—Atpowco



Enlarged reproduction free on request

Servant of Freedom

Mighty servant of all America is the great Construction Industry. Now during the war it is helping to crush our enemies. With victory Construction will again serve the peace-time progress of free men.

Already America's vast network of highways, bridges and airports is helping to free men from barriers of distance, time and transportation costs . . . massive dams are making low-cost electricity available to more and more millions, lifting old burdens . . . vast aqua-

ducts and sanitation systems are contributing to our people's health.

With the return of peace, Construction will bring in its train ever new and greater contributions toward the better life for all.

★ ★ ★

Wickwire Rope is proud of the privilege of helping the Construction Industry in its engineering accomplishments . . . in quarries, on highways, in the building of dams, bridges, and structures of all kinds.

A CHALLENGE

The present shortage of steel, and of wire rope, challenges each member of the Construction Industry to make each length of wire rope now in service last longer than ever before. Every man who uses or handles wire rope can help.

We will be glad to furnish free copies of the helpful book "Know Your Ropes," which pictures the right and wrong ways to use wire rope. **TAKE UP THE CHALLENGE - WRITE FOR YOUR COPY - AND MAKE SURE ANY NEW MEN KNOW THE RIGHT WAYS.** . . . Address Wickwire Spencer Steel Company, 500 Fifth Ave., New York, N. Y.

COPYRIGHT 1943, WICKWIRE SPENCER STEEL COMPANY



WICKWIRE ROPE

Sales Offices and Warehouses: Worcester, New York, Chicago, Buffalo, San Francisco, Los Angeles, Tulsa, Chattanooga, Houston, Abilene, Texas, Seattle. Export Sales Department: New York City



On America's Greatest Northern Air Base

TWO JAEGER PAVING TEAMS Lay 11,500 Linear Ft. of 10 Ft. Slab in 12-Hour Shift!



JAEGER SPREADER-FINISHER TEAMS
for laying roads and runways in widths
to 25 ft. at speeds which have exceeded
275 linear ft. per hour of 25 ft. slab and
475 linear ft. per hour on 10 ft. work.

To build the latest stepping-stone to Europe, in a remote land without roads, McNamara Construction Co., Ltd., chose Jaeger Concrete Screw Spreaders and Jaeger Type "H" Finishers to team with two 34E pavers—worked 24 hours a day to complete 623,000 sq. yds. of 6" concrete runway in 10x100 ft. slabs—reached production rate as high as 13,000 sq. yds. (11,500 linear ft.) per 12-hour shift. Runways, which measure 200x6000 ft., already equal 53 miles of 20 ft. roadway—will constitute one of world's largest fields when extensions are completed.

All equipment, including complete machine shop and gravel plant, workmen, materials and supplies (except local aggregate) had to be brought in by ship thru submarine-endangered waters open to navigation less than half of the year—a testimonial to the difficulties of the operation, the efficiency of its organization and the dependability of the equipment selected.



FOR HELP ON YOUR OWN PAVING, MIXING AND PUMPING PROBLEMS, CONSULT YOUR JAEGER DISTRIBUTOR: He offers you proved machines and methods, experience in job layout and equipment, knowledge of local conditions, complete stock of repair parts and service to keep your equipment rolling at today's fastest pace.

JAEGER "SURE-PRIME" — THE PUMPS THAT EXCEED THEIR PROMISES: The only pumps that, for years, have been individually tested and certified for vacuum, capacity and pressure and regularly exceed this guaranteed performance—with up to 5 times faster automatic priming, with high air and water capacity under adverse conditions, with thousands of extra hours of trouble-free service. Finest engineered pumps on the market—high pressure shell construction, replaceable liners, longest life seal (the only seal accessible for quick inspection) hi-head, hi-capacity impeller on oversize shaft that is direct driven and mounted in permanent alignment. Types for every job condition, 3000 to over 200,000 g. p. h.

THE JAEGER MACHINE COMPANY

800 Dublin Avenue, Columbus, Ohio

Stocks and Service in Over 100 Cities

FOR WORK WELL DONE

From the burning sands of Africa to the steaming jungles of Guadaleanal, our fighting men on land and sea are in the thick of battle, clearing the way to Victory.

It is our responsibility here at home to keep vital war supplies rolling in ever increasing volume to these men who are doing such a magnificent job on the world's far-flung battle fronts.

War plants, shipyards, air fields, military highways must be built in record time. Cargo ships must be loaded and unloaded without delay. Such a tremendous task requires cranes, shovels and draglines in great numbers.

Since the bombing of Pearl Harbor, the men and women of the Shovel and Crane Division of Lima Locomotive Works, Incorporated have been building cranes, shovels and draglines with determination to meet every specification and to exceed every schedule set for them.

As a reward for outstanding accomplishment in the production of war materials, the Army and Navy have conferred upon this Division, the Army-Navy "E" award. Labor and management are proud of the award and the part they are playing in the battle of production.

It will continue to be our pledge to build better cranes, shovels and draglines faster until Victory is won.

We are mindful of the fact that without the fine cooperation of our many suppliers who have furnished us with parts and materials, our award of the coveted Army-Navy "E" flag would not have been possible.



LIMA

SHOVELS, 1 YD. TO 31 YDS.

DRAGLINES

CRANES 13 TONS TO 65 TONS

VARIABLE



LIMA LOCOMOTIVE WORKS, INCORPORATED
Shovel and Crane Division **LIMA, OHIO**

He Helps BOTH His Older Brothers



HE BELONGS to a large family of wonder workers.

They are men of faith, who perceive not only the difficulties, but the ways to surmount them.

The Oldest Brother of the family is more active today than ever before. He is over 5,000 years old, but every army drafts him. His name is Military Engineering.

The Second Brother also counts his years by the thousands, although his modern name is not more than 200 years old. His work is with great structures . . . with waterways, railways and highways . . . with lighthouses, harbors and airports. His name is Civil Engineering.

The Third Brother is a youth with only a century or so to his credit. He designs . . . constructs . . . applies, sells and maintains apparatus for generating, transmitting and using power. His

name is Mechanical Engineering.

He founded this company 50 years ago. Here, under the name of Rex Mechanical Engineering—Rex M. E.—he has been working for the Second Brother—Civil Engineering—by providing better machines for mixing concrete, placing concrete and for removing water.

For the duration, he is working for both his Older Brothers—to help the Oldest finish his job and retire.

Now, as in the years of peace, he designs . . . manufactures . . . applies . . . sells and maintains machinery for concrete mixing and placing, and for water removal.

While working to bring V-Day nearer, Rex M. E. is learning and applying many things that are helpful now, and may be even more so afterward.

REX

CONSTRUCTION MACHINERY

Concrete Mixers • Moto-Mixers • Speed Prime Pumps
Pavers • Mortar and Plaster Mixers • Pumpcretes

CHAIN BELT COMPANY OF MILWAUKEE

BREAK THROUGH

leads to success—breakdown, to defeat. To avoid breakdown of CONSTRUCTION operating schedules use . . .

SINCLAIR PENNSYLVANIA and OPALINE MOTOR OILS, gear oils and greases. These specialized lubricants give the wear protection that keeps equipment standing up to heaviest schedules and hard drive of continuous operation.

Write for "The Service Factor"—a free publication devoted to the solution of lubricating problems.



SINCLAIR LUBRICANTS-FUELS

FOR FULL INFORMATION OR LUBRICATION COUNSEL WRITE NEAREST SINCLAIR OFFICE

SINCLAIR REFINING COMPANY (Inc.)

2540 WEST CERMACK ROAD
CHICAGO

Page 24 — CONSTRUCTION METHODS — February 1943

10 WEST 51ST STREET
NEW YORK CITY

RIALTO BLDG.
KANSAS CITY

573 WEST PEACHTREE STREET
ATLANTA

FAIR BUILDING
FT. WORTH



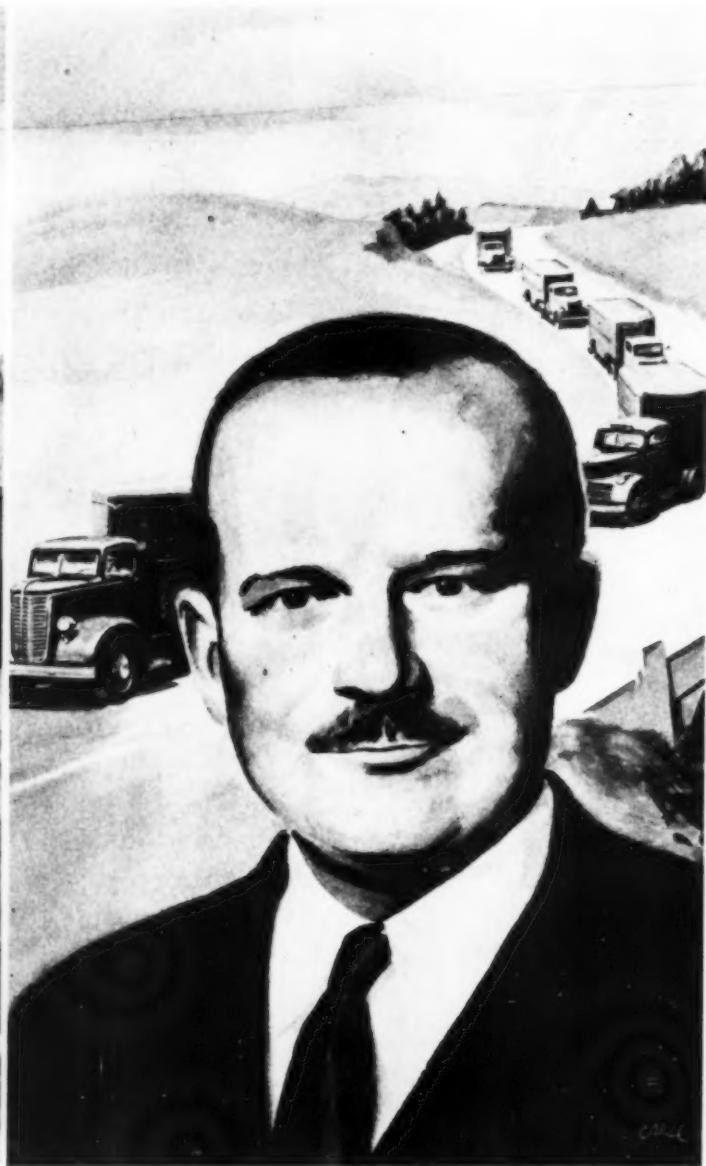
POWER TO WIN

Your Dollars Have
Power, too —
Buy War Bonds



Victory depends on power — power to hew new roads through vast wildernesses — power to build and produce — power to propel our tanks, ships, and airplanes. Power is Continental's meat. For 42 years Continental has been producing power exclusively. Today, dependable Continental Red Seal Engines are providing an ever increasing volume of "Power to Win" for farms, industry, and our land, sea, and air forces.

Continental Motors Corporation
MUSKEGON, MICHIGAN



1. Combat team tactics, coordinating the efforts of tanks, infantry and planes, is an important part of the strategy of American Armed Forces. It was also used successfully by General Montgomery in driving Rommel out of Egypt. Teamwork on the largest scale ever conceived by man will win Victory for America and our Allies in the fight for Freedom.

2. A. C. Scott, Vice-President, Geo. F. Alger Co., Detroit, specializes in doing the "impossible." Alger hauled the bulk cement for the Ford Willow Run plant, new Wayne Airport, and other projects. Scott inaugurated 24-hour maintenance—intensive inspection and driver care calling for 100% teamwork between all departments in his "turn on the steam for Victory program."

TEAMWORK WINS!

In the armed forces . . . and on the home front, too . . . it takes teamwork to win! Timken's new A.M. (Axe Maintenance) Program tells you how to team up with your operating and maintenance departments to save tires, brakes, axles to insure longer vehicle life, cut costs and save critical materials. Write us today for FREE A.M. aids or talk to a Timken Field Representative — there's nothing to buy.



TIMKEN AXLES

THE TIMKEN-DETROIT AXLE COMPANY, DETROIT, MICHIGAN
WISCONSIN AXLE DIVISION, OSHKOSH, WISCONSIN

TIPS to Help You Make Your ATHEY FORGED-TRAK TRAILERS LAST LONGER

Follow These Simple Rules



Grease and lubricate wheels after each 8 hours' operation



Check wheels regularly—oil seals; alignment; bearing cages



Keep track plate bolts tight



Track rails can be built up by welding



Wheels can be rebuilt by welding material on rims



Track hooks and pads can be built up, thus restoring arch in track assembly

MAINTAIN STEADY PRODUCTION, CONSERVE CRITICAL WAR MATERIALS BY BETTER CARE OF PRESENT ATHEY EQUIPMENT

To make your construction equipment serve as long as you can is one of today's chief problems. Because of its part in essential Victory construction work, your equipment is vital to winning the War. That's why good care today is more important than ever before. You can extend the life of your Athey Trailers by following a few simple rules. (1) Inspect and lubricate them as recommended in your instruction book, (2) recondition them promptly when they show signs of wear. Let your Athey "Caterpillar" Dealer help you take better care of your Athey Trailers. He is well equipped to serve you. For more detailed facts on field repairs send for our bulletin "Field Reconditioning of Forged-Trak Wheels". Write Athey Truss Wheel Co., 5631 West 65th Street, Chicago, Illinois.



Serving the Allied Nations On Every Essential Front

Athey products are busily engaged, in this country and abroad, building airports, military and access roads, landing fields, other war construction projects. They're hauling heavy machinery in the oilfields — moving unprecedented loads of logs to the mill — toting material and supplies through untamed underbrush in isolated outposts — speeding iron ore for steel production — serving with the combat engineers.

athey

FORGED-TRAK TRAILERS



Ask your Standard
Automotive Engineer for his
suggestions to help you meet ODT
fleet conservation requirements.

For Fleet Operators Only . . . War-time restrictions limit the civilian use of STANOLUBE H. D., but because of the vital need for conserving your equipment it has been made available to fleet operators. Take advantage of this opportunity. Put Stanolube H. D. and Standard's Fleet Conservation Service to work on the biggest problem you have today—to make your present equipment last for the duration.

Write Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago, Ill., for the Engineer nearest you. In Nebraska, write Standard Oil Company of Nebraska at Omaha.



... helps salvage drive

Fleet Conservation Service helps speed war contract. When the drive for scrap was stepped up in Des Moines, Robinson Bros. & Co., subsidiary of the Ft. Dodge Iron and Metal Company, needed every minute of operation from its shovels, trucks and tractors. A Standard Automotive Engineer who was called in, made suggestions on improving operation and on products that would insure uninterrupted schedules. In the first 35 weeks of operation over 100,000 tons of material were handled without one shutdown or failure of the equipment.

Heat-proofed Stanolube H. D.

How this remarkable new oil will
help you conserve equipment

Beats Heat . . . Stanolube H. D. was developed to combat the destructive effect of higher engine heats on motor oil. The efficiency of the internal combustion engine has been greatly improved in recent years. This has been brought about, in part, by increasing the horsepower through higher compression ratios, closer fitting parts, and higher engine speeds. But these changes have also increased operating temperatures of modern engines to the point where a conventional motor oil oxidizes 6 to 16 times faster than it did in engines of five to ten years ago.

That was the problem Standard Oil technicians started out to solve. And the new "heat-proofed" STANOLUBE H. D. is their answer.

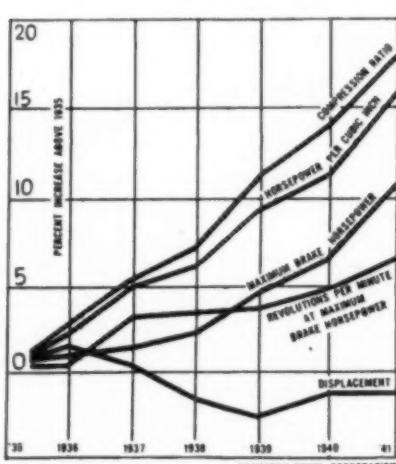
Cleans Engines . . . There are motor oils that partly solve the oil oxidation problem by loosening sludge deposits, and by keeping

oxidized parts of the oil in suspension until they are removed by draining (a detergent action). But the rise in operating temperatures of heavy duty gasoline engines and the high temperatures in Diesels required more protection—an oil that would resist oxidation—a heat-proofed oil.

This is accomplished by combining, in Stanolube H. D., a special petroleum-base inhibitor, developed in Standard Oil laboratories, with a highly refined stock. The resulting oil has both a detergent action and unusual resistance to oxidation, even at temperatures above those encountered in present day engines.

This means that Stanolube H. D. practically eliminates troublesome varnish formation and other engine deposits, along with the resulting clogged oil lines and screens, and dirty filters—conditions that cause stuck valves and rings, bearing failures and excessive engine wear.

Oil is ammunition . . . Use it wisely



Trend of American bus and truck engines from 1935 to 1941, showing some factors contributing to higher engine heats.

STANDARD OIL COMPANY (INDIANA)

★ FLEET CONSERVATION SERVICE

*then I said
to myself-*

**EVERY WELDING
INCH IS A
"BIG INCH"**



It's "BIG INCH" or Blockade for Your Business

"Big Inch" didn't just happen — Nazi subs FORCED it — by sinking tankers right and left — just when war industries and armed forces had zoomed demands on the East Coast. We had to do something BIG and QUICK.

ALTER EGO: Right! Our torpedo-firing "competition" forced our hand — forced us to build "Big Inch" — world's largest pipe line — 24" diameter, 1500 miles of it — big enough to pour 300,000, bbl. East Texas oil daily to the East Coast — equal to 150 10,000-ton tankers.

And the record speed for building this record pipe line is made possible by welding.

ALTER EGO: Well, it's just the same story of competition with ships, planes, tanks, guns and all the other SPEED RECORDS made possible by welding. Competition forces progress.

But, what will take the place of present "competition" to FORCE the same records in speed, lower costs and improved designs in the post war Battle for Business?

ALTER EGO: Just plain sales competition will force change-over to the "Big Inch" method of construction. We'll change or we'll face business "blockade"! So we should start NOW on the right-of-way in welding knowledge if we ever expect profit in post-war business.

Ask your inner self whether it would be smart to get welding guidance, of "big inch" caliber, right NOW from

THE LINCOLN ELECTRIC COMPANY • CLEVELAND, OHIO



How They Pass the Ammunition in New Guinea

A typical example of B. F. Goodrich development in truck tires

IN JUNGLE-MATTED New Guinea most of the fighting is an inch-by-inch, tree-by-tree affair. It's primitive country where mechanized equipment counts heavily—but where it's mighty tough to use it.

Here American-built Army trucks have an unromantic but important job of hauling ammunition and supplies to the front.

As well as tires for this purpose, B. F. Goodrich builds a special combat tire, designed to keep on rolling when hit with rifle and machine gun bullets. Other tires in Army service have super-traction treads that carry heavy trucks through mud and gumbo, across rivers and ravines, over swamps and deserts. Still others are special tires made with B. F. Goodrich synthetic rubber—Ameripol.

B. F. Goodrich has gone "all out" for war production, but that means taking care of essential civilian requirements, too—with tires designed to give the greatest possible mileage for every pound of rubber used.

And many of the truck tires we are offering owners with ration certificates today are exactly the same as those used by the U. S. Army!

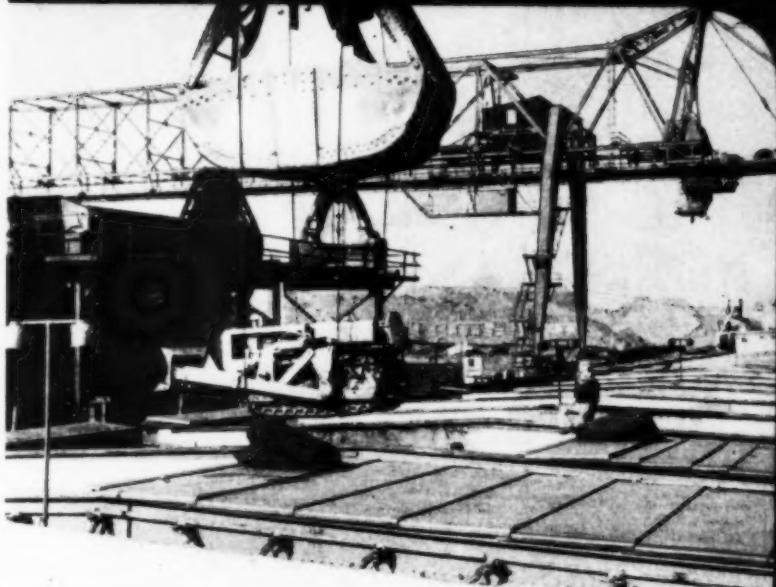
When you must buy, get good tires. B. F. Goodrich Speedliner Silvertowns for trucks and buses have an amazing record for long mileage in all types of service. They are all built with a broad, flattened tread construction which gives many

more miles per pound of rubber.

And some day they may be made with Ameripol synthetic rubber. When they are, remember that eighteen months before Pearl Harbor B. F. Goodrich was first to offer American car owners tires made with synthetic rubber.



War front or Home front!



Above: Down into the gigantic hold of a coal carrying freighter unloading at a Canadian port goes this sturdy LaPlant-Cheote 4-R Trailbuilder.

These **TRAILBUILDERS**
Help Save Time
Work
and Money...

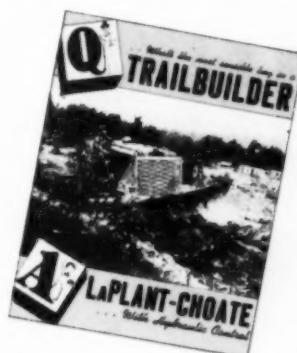


Right: Here the Trailbuilder is hard at work speedily moving coal into one end of the hold so that the big 12-ton bucket gets a full load every time!

HOME FRONTS are battle fronts, too, and this time and work-saving Trailbuilder is doing a job just as important to the United Nations as any on the battle front! Here two men and a Trailbuilder are doing the work of five . . . and doing it in less time. Conservative estimates clearly show that this improved method of piling coal speeds unloading enough to enable this ship to make several more trips each year. Every additional trip our ships make to hurry the vital materials of war helps speed an Allied triumph. And LaPlant-Cheote equipment is leading the way through this period of crisis toward Victory!

There has been no "freezing" of United Nations engineering skill and ingenuity in this emergency. And here at LaPlant-Cheote, this accelerated pace has strengthened immeasurably our thoughts and plans for the future. The War will end, and when it does, there will be more work to do than ever. Neglected highways will need repairs. New roads will have to be built. Motor travel will boom to new peaks. Airports will be built by the thousands. Planes will be one of the foremost means of transportation, for they have received a much greater impetus than that given the automobile in the last war. War orders and the filling of the tremendous backlog of post-war demands of all kinds will expand our manufacturing and shipping industries so tremen-

mendously that they will be one of the most important factors in the world-wide development of highway, rail, water and air transportation.



Write for your copy of the LaPlant-Cheote Hydraulic Trailbuilder booklet illustrated at left. It shows this equipment at work on an interesting variety of jobs all over the world—in industrial uses, in road and highway building, earthmoving and pioneering roads. In it, the world-wide sales and service facilities of the LaPlant-Cheote distributor-dealer organization is fully explained. Ask your nearest distributor for service and a helping hand wherever you're working. He can save you time and money!

TOP THAT 10% THROUGH 1943

Our Government is asking each of us to save regularly at least 10% of his income in War Bonds. Sign up today!

LA PLANT-CHOATE

Manufacturing Co. INC.

Factory & Home Office
Cedar Rapids, Iowa

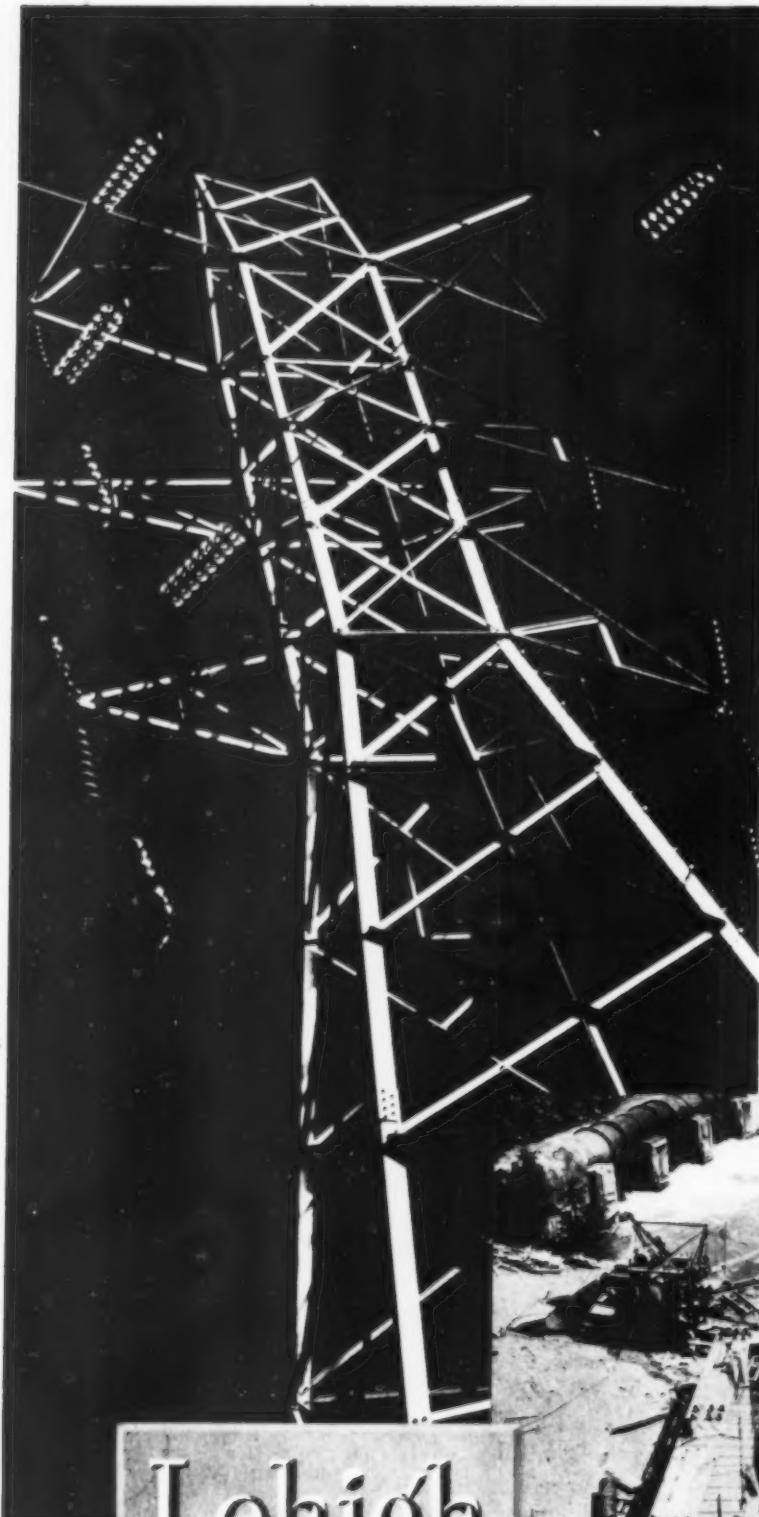
Pacific Coast Office
San Leandro, Cal.

EARTH MOVING

LAND CLEARING

SNOW REMOVAL EQUIPMENT

More



Lehigh
CEMENT

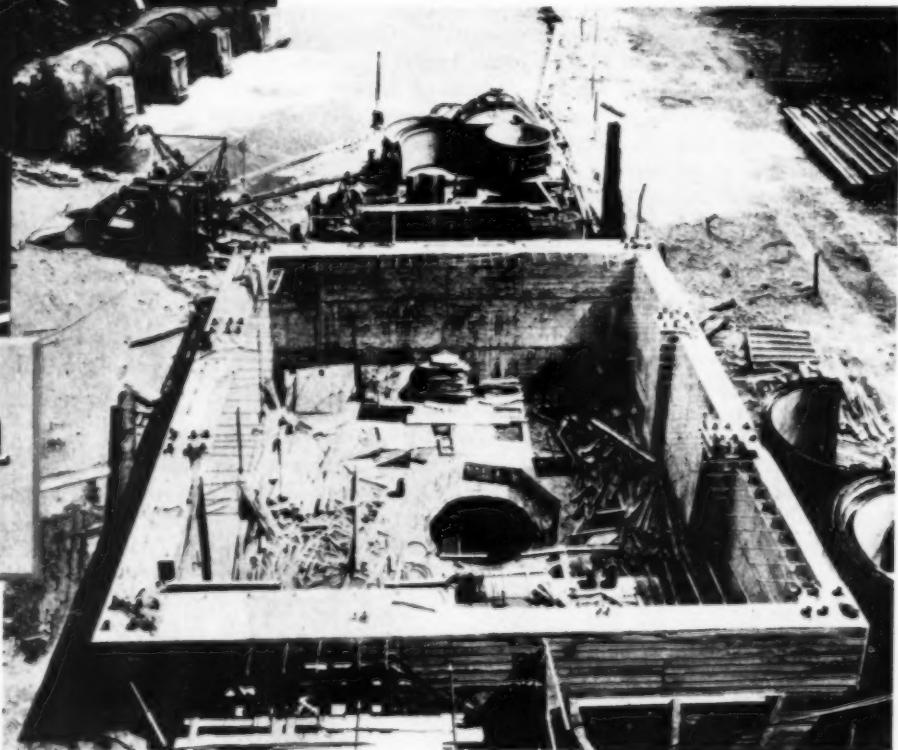
POWER to you...AMERICA!

One of the striking things about America in peace-time was its heavy use of power. Now, in wartime, America is a downright glutton.

For many of the new power plants that war called into being, Lehigh Cement made the concrete required. And when service strength concrete was needed in a hurry in key sections of the jobs—it was Lehigh Early Strength Cement that got the call. For this fast-working cement makes service-strength concrete in 1/3 to 1 1/2 the normal time. This quick strength is especially important in cold weather: it lessens the danger of frost-damage, it cuts heat protection time and reduces costs. And remember, Lehigh Early Strength Cement makes finer, denser, concrete, too.

The advantages you get by using this time-saving cement are as real, as useful, on your civilian projects as on any wartime work. Use Lehigh Early Strength Cement for all your concrete construction; and ask the Lehigh Service Department for data or counsel at any time.

Lehigh EARLY STRENGTH CEMENT
for service-strength concrete in a hurry



LEHIGH PORTLAND CEMENT COMPANY • ALLENTOWN, PA. . . . CHICAGO, ILL. . . . SPOKANE, WASH.

SHOW 'EM YOU ARE CONSERVING!



DISPLAY

THIS FREE EMBLEM

(Actual size 5" in diameter)

Important . . .

Operators of all types and makes of equipment are welcome to send for the same red, white and blue emblem. Easy to apply on metal, glass or wood. Nothing to sign except your name and address on a post card addressed to us.

• It's only a red, white and blue sticker but it means a lot to Uncle Sam's war effort because it shows that these operators are conserving their particular construction equipment—making it last longer and work faster, with all the means and experience at their control.

Doesn't make any difference what you run—shovel, bulldozer, tractor, scraper or truck—there's one of these colorful 5" emblems for you. Just send your name and address and say that you want to show others that you are conserving.

24-Pages of HOW-TO-KEEP-'EM-ON-THE-JOB Ideas

Want some practical ideas on how to make quick, emergency repairs; on how to temporarily substitute for critical, hard-to-get parts and materials? Then write for this new Fix-It Handbook. It will help you salvage and conserve worn parts and will save you time and money, too.

THE THEW SHOVEL COMPANY
LORAIN, OHIO

THEW-LORAIN
CRANES • SHOVELS
DRAGLINES • MOTO-CRANES



NO WAR, EVER BEFORE, SAW SHIPS BUILT IN 6 DAYS

...nor the modern Preformed wire rope

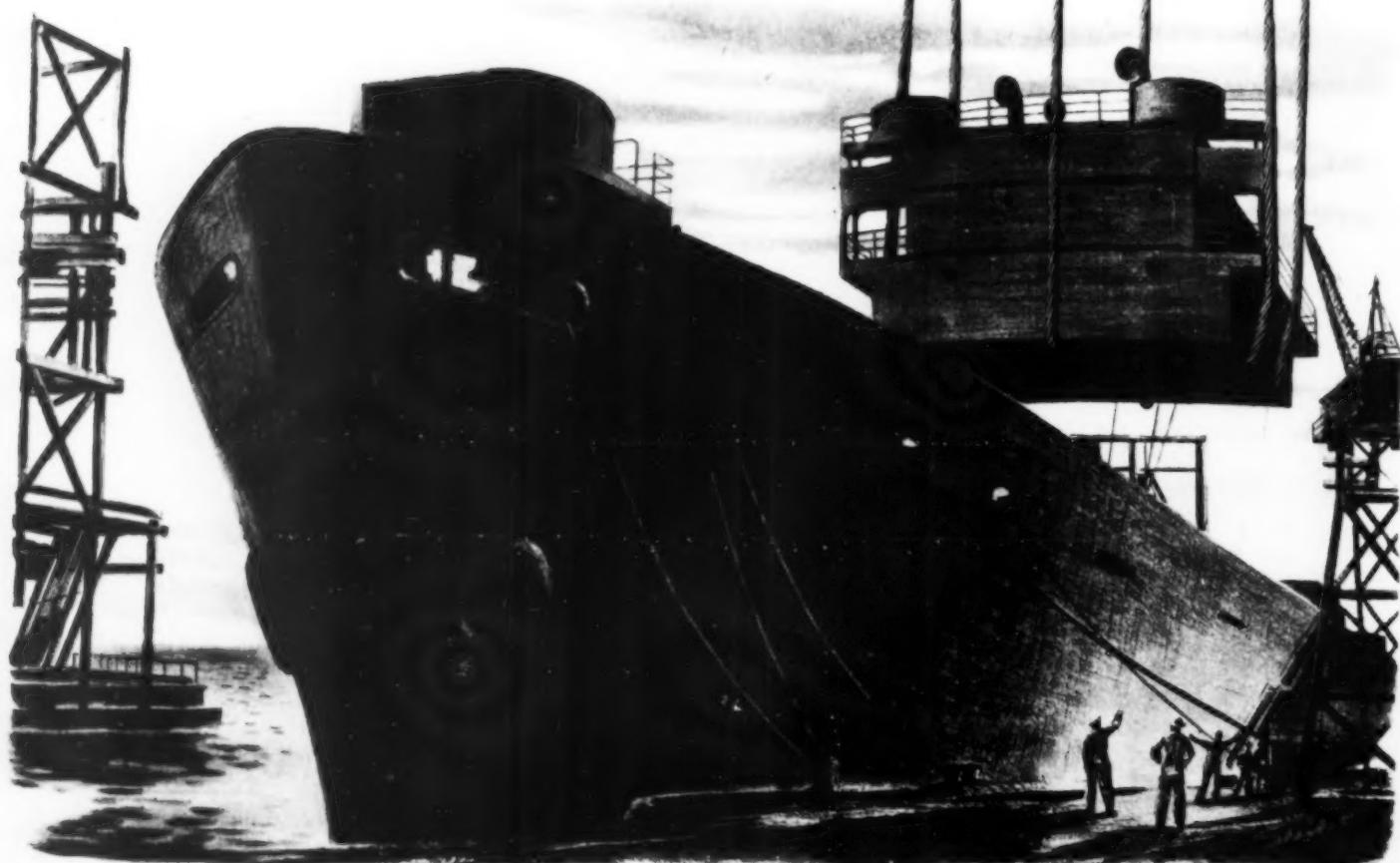
THAT LIFTS AND SWINGS THEIR PARTS INTO PLACE

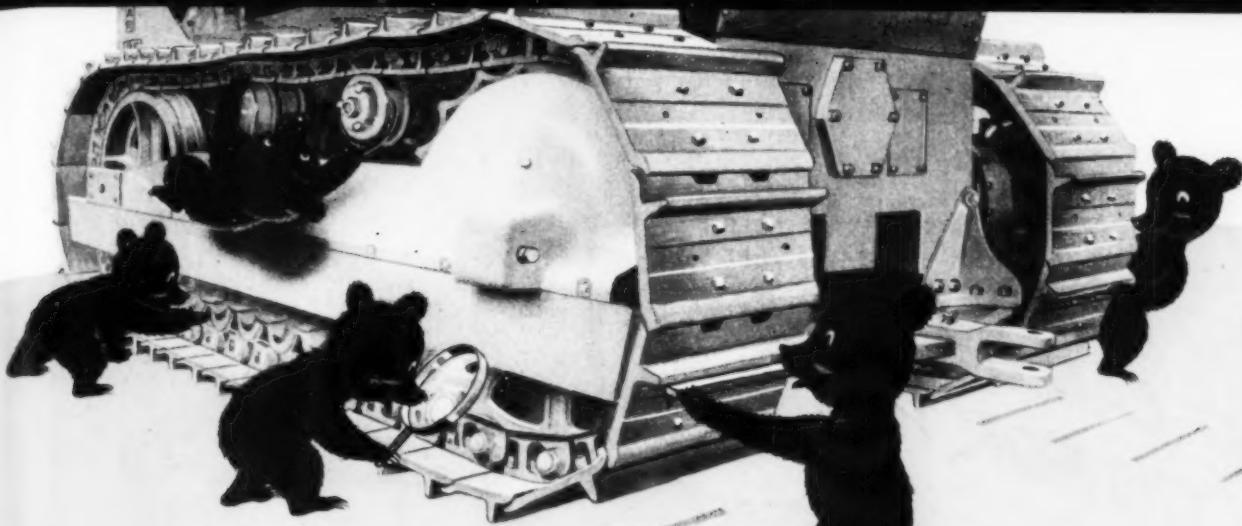
New to this war—the ship-building speed records being shattered from day to day.

New to this war, too—the Preformed Wire Rope which is playing such a giant role in the ship-building program; *new to this war*—though tested and proved through years of peacetime production, as if in preparation for the tough wartime tasks ahead.

Tested and proved stronger, longer lasting, more flexible, more easily handled—cutting shutdowns, cutting accidents, cutting costs—Preformed Wire Rope is doing a *front-line* job on hundreds of assignments in ship-building, as well as maintaining its *home-front* job in industry.

Ask your own wire rope manufacturer or supplier





TRACKS-

BEAR THEM IN MIND



Cutting off a worn sprocket rim with acetylene torch

YOUR "Caterpillar" track-type Tractor gets much of its tremendous pulling power from the broad, steel-grousered tracks on which it runs. Barefooted, your tractor wouldn't be much good to you or the nation.

So in these days when every ounce of machine power counts for victory, you'll want to give special care and attention to tracks. There are many things you, yourself, can do to prolong the track life of your tractor. Here are some of them:

1. Keep the rollers, idlers and diagonal brace bearings lubricated. This should be done more frequently if your tractor operates in mud or water.
2. Keep the track tension correct, and the front idlers in alignment, so that wear will be evenly distributed.

3. Don't abuse the machine. A "Caterpillar" track-type Tractor is built to take a lot of punishment, but it will run longer and more efficiently if you avoid undue shocks and overloading.

4. Go over the nuts and bolts periodically to be sure they're tight. Look — and listen — for signs of wear.

When tracks are worn to the point of needing repair, your "Caterpillar" dealer is a past master at restoring their working efficiency. His excellent service facilities are available night and day, ready to:

1. Weld new grousers on track shoes.
2. Build up worn rollers by welding.
3. Build up the rail side of worn track links.

4. Turn track pins and bushings. In some cases this will actually double track life.

5. Cut off worn sprocket rims and weld on new rims.

6. Switch rollers, especially if your equipment puts extra load on the front, rear or one side of the tractor.

All these types of track service save metal — vital in today's war effort. Your "Caterpillar" dealer is carrying on a home-front war against waste. He's pledged to keep your "Caterpillar" equipment working with the least possible expenditure of war-needed materials. Call on him for counsel, service and repairs, and ask for a copy of the useful new booklet, "Keep 'em Working." Your "Caterpillar" dealer is your partner and our partner in maintaining the efficient operation of "Caterpillar" equipment wherever it is working.

Building up track shoes with new grousers



CATERPILLAR

DIESEL

CATERPILLAR TRACTOR CO., PEORIA, ILLINOIS

TO WIN THE WAR: WORK—FIGHT—BUY WAR SAVINGS BONDS!



Bethlehem Wire-Rope distributors can supply you with a full range of wire rope, either from stock, or on prompt mill order. Bethlehem's mills are making rope at top speed, night and day. We produce a size, grade of steel, construction and type of center to handle every job in the contracting field.

Due to war emergencies—unexpected red-rush orders for military wire ropes—we can't promise ahead of time just how fast we can deliver. We can say, however, that we'll do our level best on every order. If you're working on a war contract or some war-related job, you can expect to get your rope within your normal time requirements.

There are more than 260 Bethlehem Wire-Rope distributors in key locations throughout the United States. They know wire rope thoroughly, and are always willing and able to help contractors. Why not give your local Bethlehem Wire-Rope distributor a ring? He'll be glad to hear from you . . . to help you in any way he can.

BETHLEHEM STEEL COMPANY



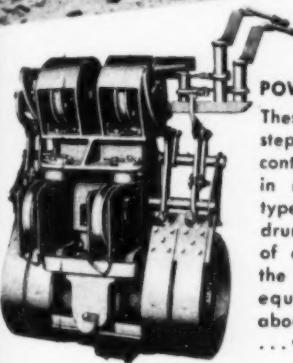
GOOD NEWS for tomorrow's equipment users from today's BATTLEFIELDS



IN this mechanized war, Buckeye tractor equipment has become battle-front equipment . . . serving under every conceivable condition, undergoing punishment that puts every part, every feature to the most gruelling test — punishment that no peacetime construction job could possibly equal. The invaluable experience of this world-wide "field test" has not only helped create the better "fighting tools" we need for victory, but also holds the promise of more efficient, faster-working, longer-lasting equipment that will make the building of our new peacetime world facilities an easier, faster and cheaper job.

BUCKEYE TRACTION DITCHER CO., Findlay, Ohio

*For real help in meeting today's problems,
in planning for tomorrow's big job—keep
in touch with your Buckeye distributor!*



**BUCKEYE
POWER CONTROL WINCHES**

These fast, rugged winches step-up output from all cable-controlled equipment. Made in medium and heavy-duty types, single and double drum models to fit all makes of crawler tractors. To get the most out of tractors and equipment, get the facts about these output-builders . . . write for information now!



BUCKEYE BULLDOZERS & TRAILBUILDERS

Every practical feature to make tractor power produce the most is provided in these modern dirt-movers.

Balanced weight maintains full crawler contact with the ground for better traction; engineered blade curvature steps up dirt moving ability and saves power. You'll find many other time and money-saving features — write for complete data.

Built by Buckeye

General Ditcher



Tractor Ditcher



Tractor Ditcher



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Three Ways

to get the most for your
tire certificates



Today these three famous Goodyear off-the-road tires are the first choice of contractors by a larger margin than ever before because . . .

Designed-for-the-job treads give more traction—more pull.

Multiple-compounded, Supertwist cord carcass provides greater strength, carries heavier loads.

Wide cross section insures maximum flotation—makes for faster operation.

The result is: Goodyears deliver more mileage—lowest cost-per-ton-mile service. Isn't that the best reason for getting Goodyears in times like these?

All Weather Sure Grip, Supertwist T.M. The Goodyear Tire & Rubber Company

One Way

to get the most miles
from your tires

Get this
FREE manual

—The Goodyear Off-The-Road tire manual gives complete information on the proper care and maintenance of these valuable tires. Expert information on all details of tire operation—can add thousands of miles of extra tire life.



GOOD YEAR

THE GREATEST NAME IN RUBBER

MORE TONS ARE HAULED ON GOODYEAR TRUCK TIRES THAN ON ANY OTHER KIND

Construction Methods

ROBERT A. TOMLIN, Editor

Volume 25

FEBRUARY, 1943

Number 2

Glued Wood Beams

Replace Critical Steel

for 67-Ft. Span



LAMINATED WOOD BEAMS (below) 67 ft. 2 in. long, delivered by logging truck to Seattle housing project, are made up of glued and nailed dimension lumber. They have 40-in. depth and 14-in. width and are built with 3-in. camber.

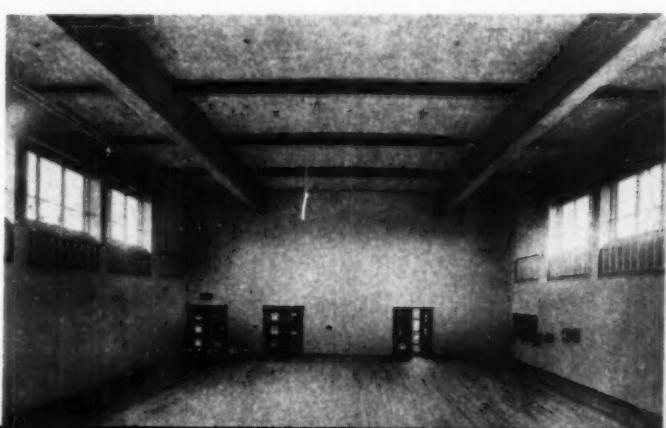
PROVIDING A DEMONSTRATION of the effectiveness of laminated wood beams as a substitute for steel beams difficult or impossible to obtain under present-day shortages of critical war materials, is the new Recreation Center at the Yesler Terrace (USHA) project, Seattle, Wash. Here two 67 ft. 2-in. beams, 14 in. wide and 40 in. deep, made up from 7,800 b.ft. of fir and spruce 2x4-in. and 2x10-in. dimension lumber, and 270 lb. of Laucks construction glue, took the place of steel girders weighing more than 10 tons, saving not only steel for war, but \$76 per beam, in addition:

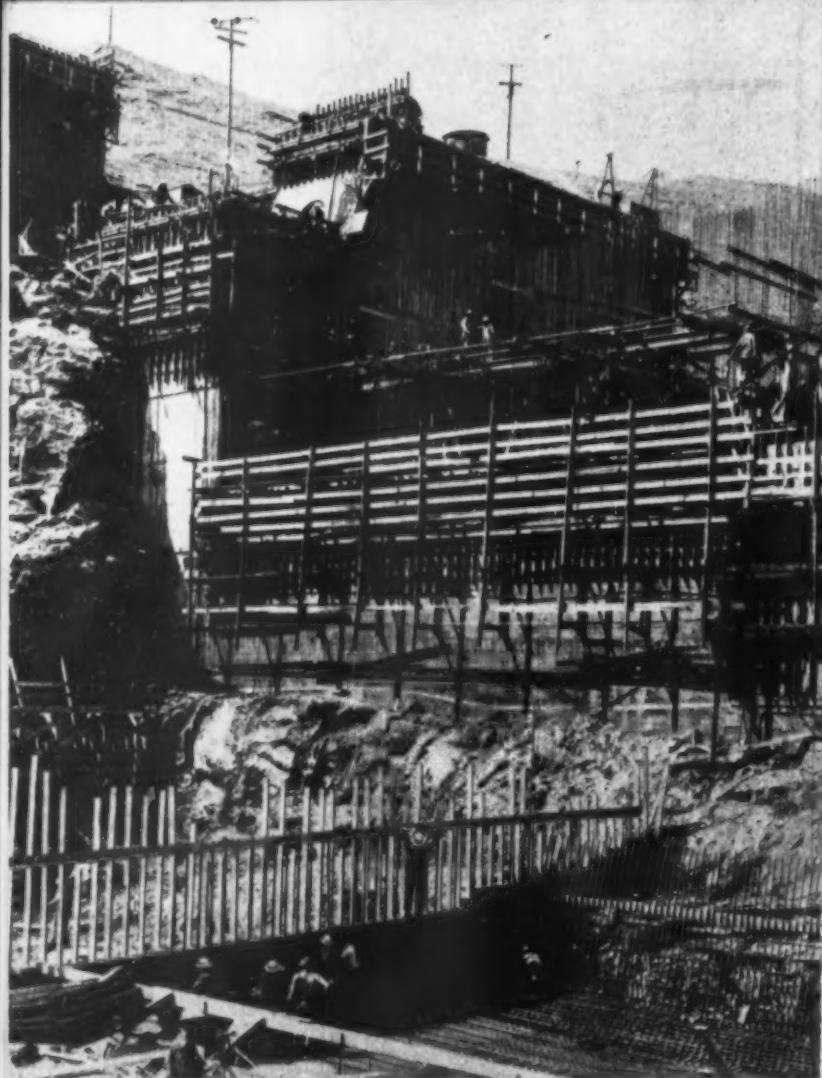
These wood beams, completed in 5½ days, were made with a 3-in. camber, and assembled with scarf joints by clamps and nails. They were delivered by logging truck. Nailing provided sufficient pressure for the adhesion of the glue-coated pieces of lumber forming the laminated beam.

Attwell Construction Co., Seattle, Wash., manufactured the beams. Bob Attwell, the manager, had been working with laminated beams and arches for many years, and designed the present beams with the help of the University of Washington Forest Products Laboratory and

Chester Hogue, technical engineer of the West Coast Lumberman's Association. Approval was given by Art Moses, structural engineer for the City of Seattle. J. C. Boespflug Co. was the general contractor for the entire project.

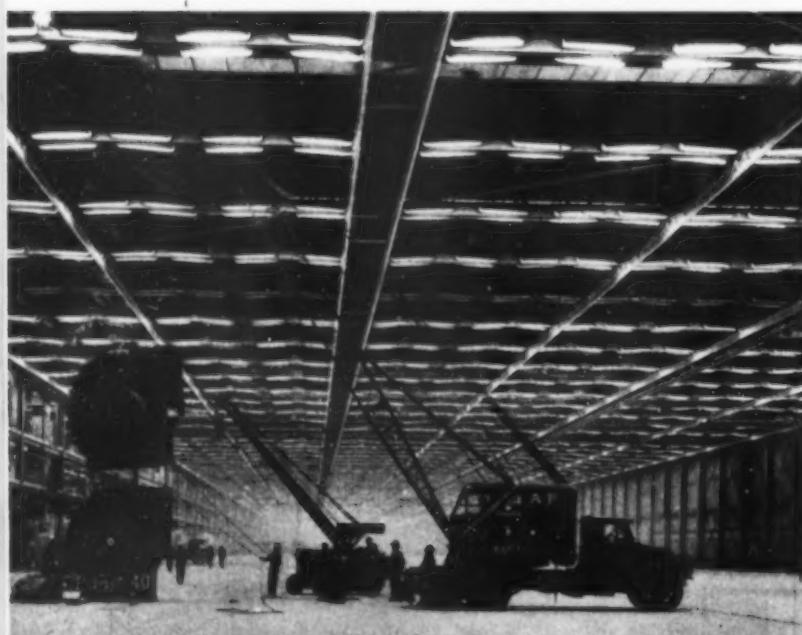
SAVING OF STEEL (below) is effected by long-span laminated wood beams, here shown in place to carry roof of gymnasium with unobstructed floor area.





POWERHOUSE SECTION of Keswick Dam, U. S. Bureau of Reclamation project on Sacramento River in California, bristles with reinforcing steel as workmen erect forms for placement of additional concrete to bind dam into its solid bedrock foundation. Work on this dam is being continued under a War Production Board order specifying certain facilities of the Central Valley Project to be completed as part of the war program. Keswick Dam will regulate variable water releases coming from huge Shasta Dam power plant under construction a few miles upstream.

LARGE FAN UNIT (below) is raised into place on air-conditioning platform above trusses in main assembly aisle of huge controlled-conditions aircraft plant in Texas, built by The Austin Co., Cleveland, Ohio. Plant is illuminated by two-tube 200-watt rectified fluorescent units with industrial white lamps. These are mounted in pairs on 5-ft. centers, parallel to each truss. White cement floor reflects light on under side of aircraft moving along assembly line, and white Fiberglas used throughout for sidewalls also has high reflecting quality.



SEVEN-MAN THREAT TO AXIS is offered by ROMBERG brothers, all employees of California Shipbuilding Corp. From left to right the seven brothers are: BERNARD, sheet-metal worker; HERMAN and MARION, chippers; RICHARD, transportation; NELSON, RALPH and CYRIL, machinists.

HOMES IN DESERT (below) for war workers at Basic Magnesium's gigantic plant in Nevada spring up where a year ago there was no water, no power, and few houses. This complete modern village, which now houses large portion of industrial workers, contains more than 1,000 demountable homes like these, as well as accommodations for 6,000 single men, and other facilities.

Wide World Photo

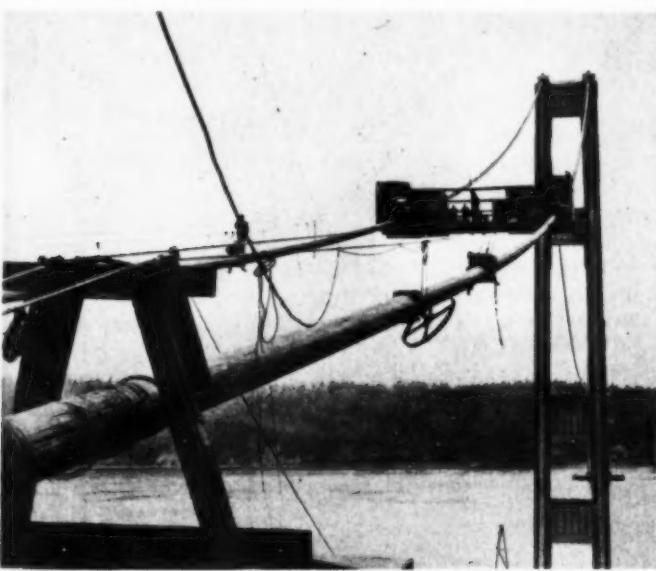




WATER TANK OF REDWOOD, supported by concrete tower, is built in Texas by Army. Substitution of wood and concrete in this structure has conserved hundreds of pounds of construction steel for military needs.



SUBLEVEL DAVISON HIGHWAY, constructed through heavily built-up section of Detroit to connect two major arteries, cuts former 20-min. traffic grind through city to only 5 min. To provide route for expressway, 132 buildings had to be razed or set back. Little more than a mile in length, road cost \$3,250,000 to build, \$1,000,000 of which was spent to obtain the 205-ft. right-of-way.



TACOMA NARROWS BRIDGE is dismantled as cable wire is salvaged by means of reeling machines set up on deck of anchorage. Process consists of cutting wires at each strand shoe, fastening one end to reel, and pulling wire over tower tops. In all, 24 wires can be taken off simultaneously. When cables have been removed, towers will be dismantled with Chicago booms.



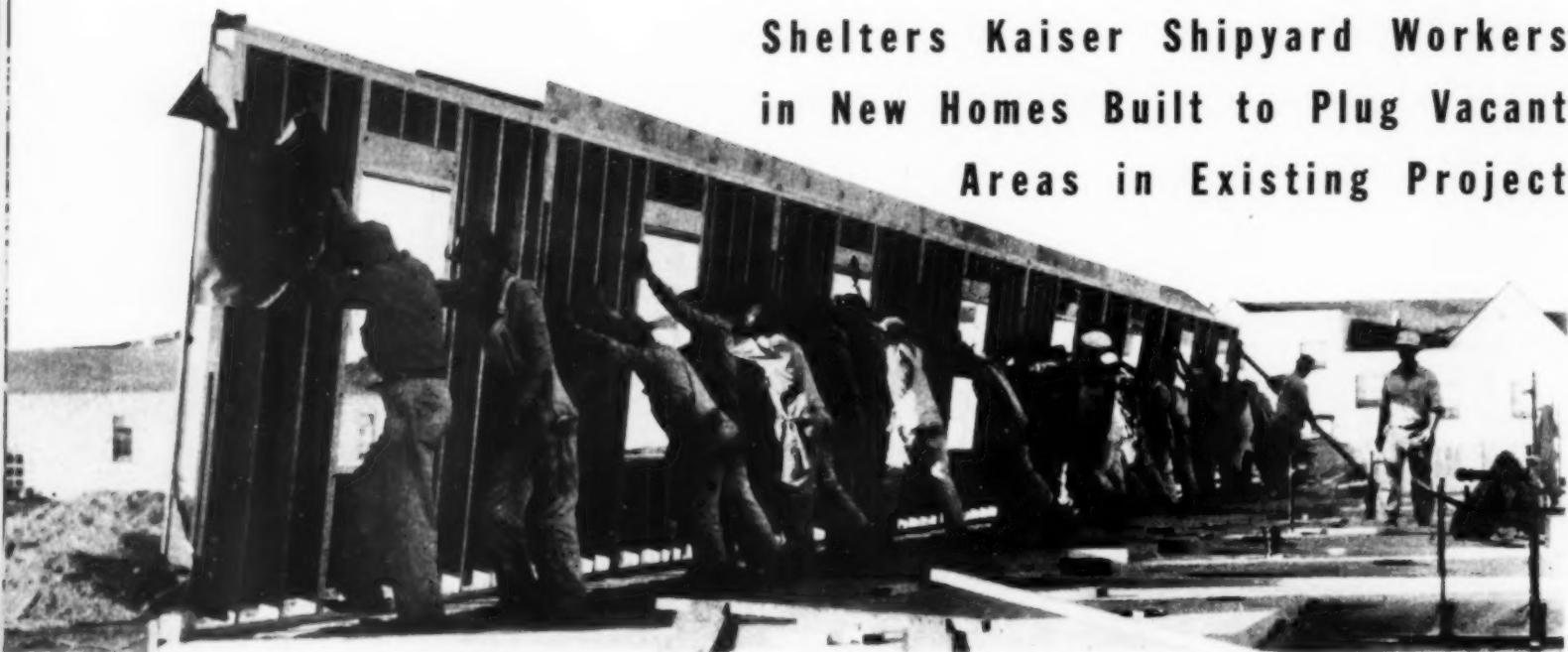
FIRST CLASS OF MAINTENANCE ENGINEERS finishes 30-day course in upkeep and repair of engineering equipment at Army Engineer Maintenance School conducted at Columbus Quartermaster Depot, Columbus, Ohio, under direction of Major F. E. Jones (kneeling at left), assisted by 1st Lt. R. E. Drake (also kneeling). Graduated as 2nd lieutenants, these men are assigned to troop duty with maintenance companies, heavy shop companies, aviation battalions and field combat troops.

PRODUCTION UTILITY BUILDING FOR NAVY (below), measuring 375x155 ft. in plan and having four main stories in addition to fifth story for fan room, here pictured in course of construction, has now been completed at Navy yard on eastern seaboard in period of five months by Turner Construction Co., of New York. Building is supported by 2,839 Raymond concrete piles from 40 to 90 ft. long. Free flow of tidal water through rock fill at site made foundation a difficult problem. Concrete was poured at rate of two floors per week and exterior brick walls were completed at rate of one story a day. Construction was directed by Navy's Bureau of Yards and Docks. Concrete was delivered to floor levels by 120-ft. steel tower equipped with 125-hp., two-engine gasoline hoist and 31-cu. ft. concrete bucket.



Housing Within Housing

**Shelters Kaiser Shipyard Workers
in New Homes Built to Plug Vacant
Areas in Existing Project**

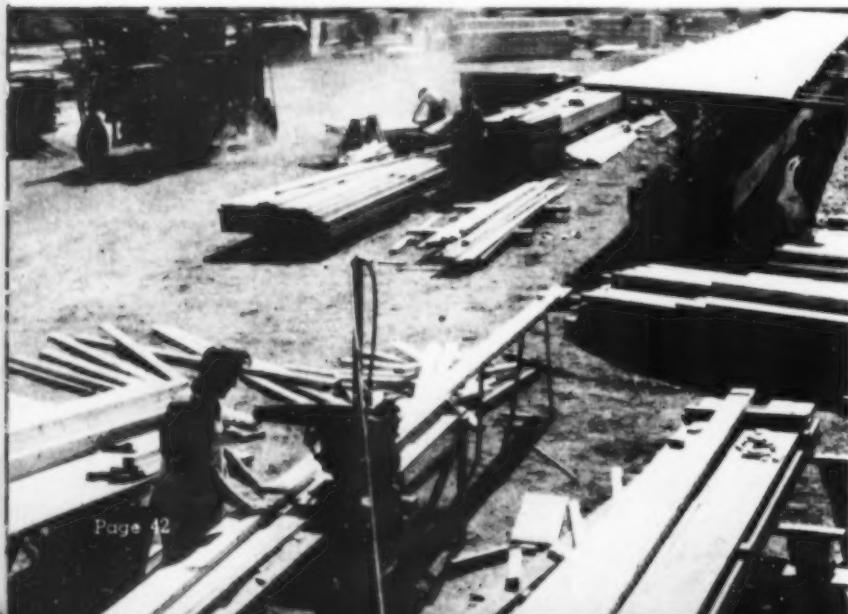


LONG WALL SECTIONS. assembled flat on floor, are up-ended by long line of construction workers

TO MEET THE NEED FOR ADDITIONAL HOUSING FACILITIES near Henry J. Kaiser's shipyards at Richmond, Calif., a plan was evolved whereby, instead of selecting a new site and carrying out thereon a mass housing project, the additional facilities required were dispersed throughout a conveniently located existing residential district. This program was adopted when it was found that in this district, within walking distance of the yards, were enough vacant lots which could be condemned as separate sites for permanent, two-story apartment buildings of eight- and twelve-apartment-size to provide a total of 6,000 apartments. Funds made available for carrying out this project total \$13,000,000.

The buildings are all 38 ft. wide; and the length is 84 ft. for eight apartments and 108 ft. for twelve apart-

MILLS FOR PRECUTTING LUMBER (below) to exact dimensions are set up at central locations where lumber can be piled. Lumber carriers (in upper left background) deliver to each building.



Page 42

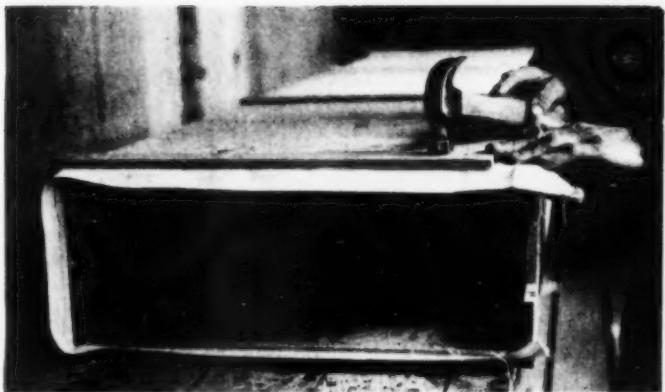
ments. The policy was to design and construct to a standard and a quality in materials and appearance that will not cause any depreciation in the value of adjoining property.

Prior to initiation of this project, temporary housing facilities, intended for use during war expansion only, had already been built in selected "sites". In contrast, this project in the residential district is to provide permanent housing that will continue to be attractive to peace-time shipyard workers after the war is over. This is in accord with the plan of the U. S. Maritime Commission to continue the building of ships of greater speed that will be needed for world trade after the war.

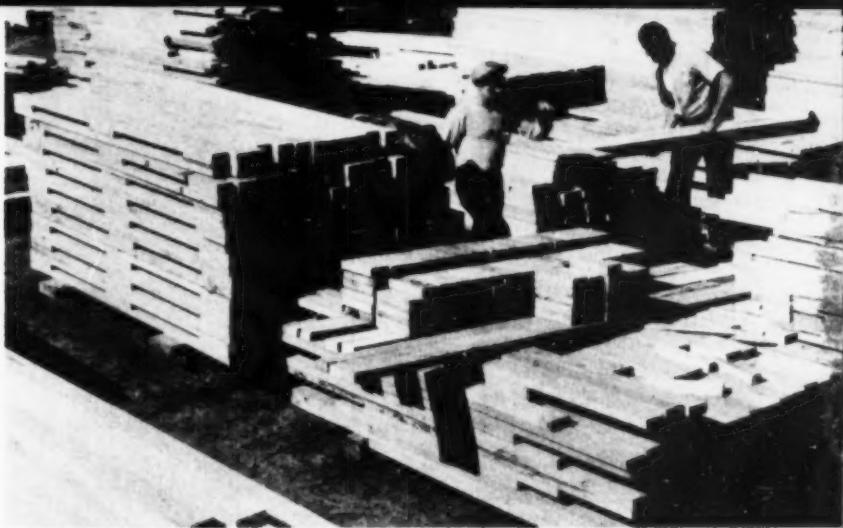
The Maritime Commission, by which the project is sponsored, wanted contractors with the ability and the

CIRCULAR SAWS (below) do lion's share of precutting.





JOINTS between adjoining warm air duct sections of plywood are made tight with overlapping strips of canvas.



SIMPLER ASSEMBLIES are prefabricated. Lumber for each house is gathered in piles for shipment.



ALL UTILITIES for 12-apartment building are grouped in central zone. Tar paper is ready to be rolled out over joists.



ROBERT McCARTHY, the big boss himself, watches crew pouring concrete foundations.

organization to expedite the construction. Several contracts were let. The one on which the best progress has been made is that held by Robert McCarthy, whose speed in constructing housing projects had made a name for him in the San Francisco Bay region somewhat parallel to the Kaiser reputation for speed in shipbuilding. (McCarthy's "40-houses-a-day" project was described in *Construction Methods*, September, 1942, p. 48).

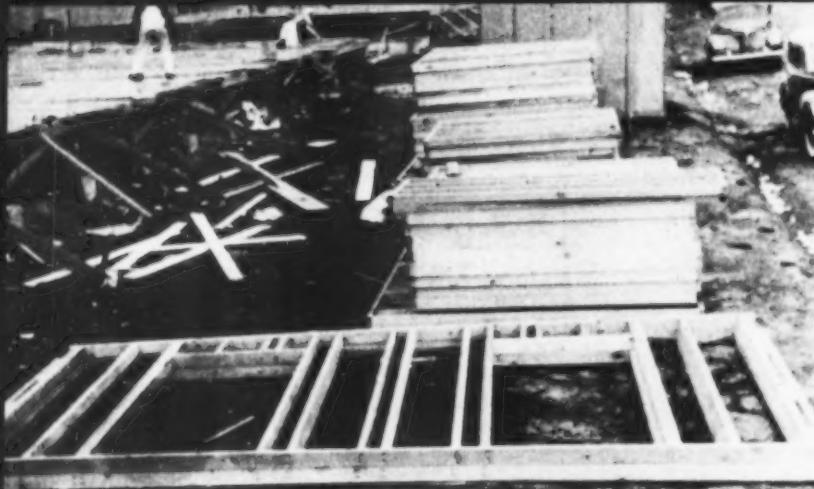
McCarthy promptly devised a program to suit this particular job. There was advantage in starting work where streets were paved and all utilities were in; there was disadvantage in having to work close to occupied residential property with a minimum of space for materials and equipment. To compensate for the lack of storage space, plans were laid for extensive precutting of lumber and deliveries of just the right quantities of materials of exactly the right size only a few hours in advance of the time they would be needed. In this way stockpiles of materials and mill setups at the site were reduced to a minimum.

At convenient central locations special mills were set up for (1) precutting and prefabricating material for wall sections, (2) assembling warm-air heating ducts of plywood, (3) making redwood eaves troughs and downspouts and (4) cutting molding, glazing window sashes



OAK FLOORING (below) in full thickness is laid over tar paper. It is here being sorted and selected for location so that nailers can make better speed.

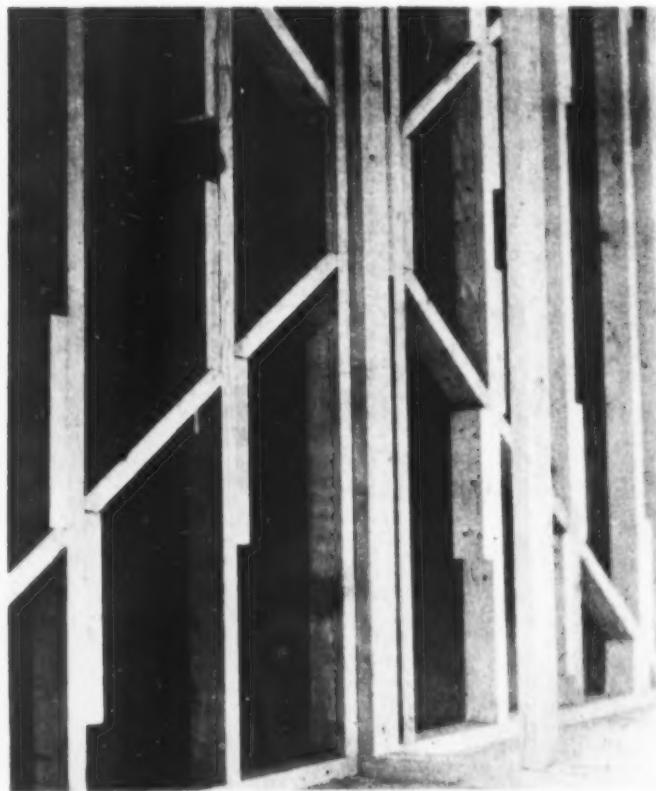




SHORTER SECTIONS of wall are prefabricated at mill and brought to building in units.



CUTTING OFF PROJECTING ENDS of flooring is done with Skilsaw. Wisconsin gasoline engine driving G-E generator is mounted on small truck driven around by saw operator for jobs of this sort.



DIAGONAL BRACING is firmly held in position by "kick blocks," especially effective in preventing wracking in region where earthquakes may occur.

INTERIOR PARTITIONS (below) are typical of small units prefabricated at mill.

and putting on the first paint coat on door frames, sashes, etc.

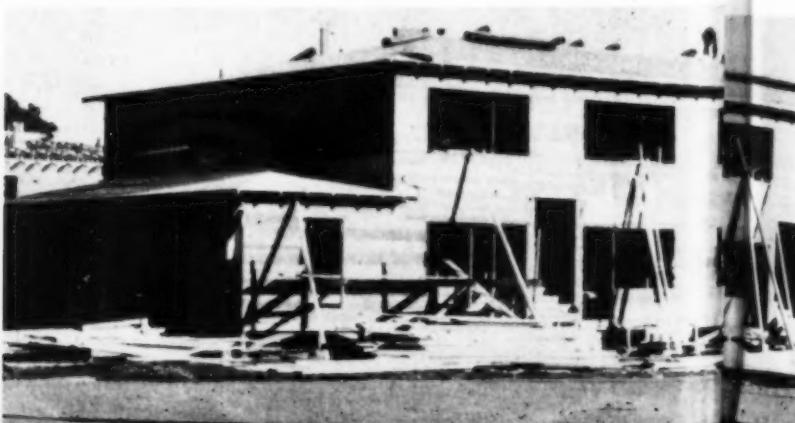
The saws and small cutting mills were located long in advance of the first erection operations. While foundations were still being laid out, batteries of saws pre-cut lumber to standard sizes which were stockpiled ready for special crews to gather the right type and size of materials which would be separately stacked for the lumber carriers which hauled them to each building.

Of the 169 buildings in the McCarthy contract, 97 were laid out for twelve apartments and 72 for eight apartments. Whether of eight- or twelve-unit size, all structures have the same general plan, being long, narrow buildings with each apartment extending transversely across the structure. This arrangement gives each apartment a 12x18-ft. living room with a folding dining table in an alcove and a centrally located kitchen and bathroom on opposite sides of a passageway leading from living room to bedroom. Living room and bedroom have windows. At each end of the building a "lean-to" roof provides a second bedroom for the end apartment and also space for utility rooms that serve the entire building. The laundry includes double trays, ironing boards, etc. and the furnace room has a warm-air furnace and an automatic water heater serving the entire building.

Economical Utility Service

With all apartments similarly laid out, i.e., with the kitchen and bathroom in the center of the structure, economical utility service can be had with relatively short, direct connections from main service lines in this central zone. In addition to water, gas, sewage and electrical services, there is a warm-air duct built of plywood (by reason of the wartime scarcity of metal) with branches

TWELVE-APARTMENT BUILDING (below) has one-story wing at each end for utilities and second bedroom.





SPRAY-PAINTING GUN applies second coat on outer wall.

to the two main rooms and the bathroom of each apartment.

These plywood ducts, which do not transmit sound as do the usual metal ducts and decrease the amount of special and higher-priced labor required on the job, were made up in sections, glued, and nailed. Adjoining ends were put together with ends of the sections overlapped by a canvas strip which is put on in the shop, attached to one end of each section.

Building Construction

Each twelve-apartment building has nine concrete foundation walls extending entirely across the building width. Between these are pier footings at intervals chosen to balance the economy in foundation and floor structure costs. No steel was put in the concrete footings. Redwood sills were bolted to the concrete foundation and floors are usually 2 to 3 ft. above ground level.

When joists were nailed and bridging was in, tar paper was unrolled over the joists and tacked in place. Oak tongue-and-groove flooring of $\frac{3}{4}$ -in. thickness was toenailed to the joists. This flooring came to the job already sanded, stained, waxed and polished and is said to cost less than a pine floor that has to be finished after laying. Immediately following the floor nailers, double reinforced Kraft paper in 6-ft. width was laid to protect the flooring. This paper was overlapped about 2 in. at the joints and the overlap was cemented with Kraft rubber cement. Thus, a working surface was provided which protected the finished floor and remained in place until the last of the interior painting was done, when it was cut away.

Wall plates, pre-cut to length and marked for their

(Continued on page 82)



SPRAY PAINTING CREW maneuvers power-driven compressor equipment into position.

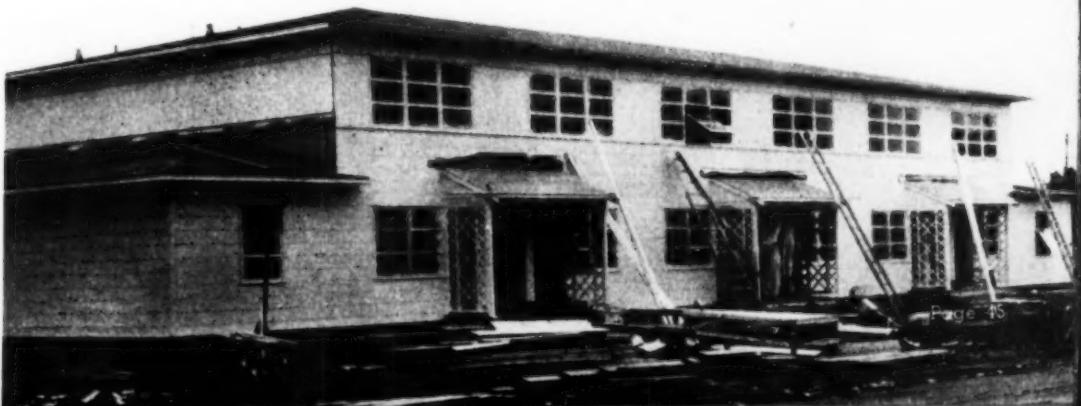


FIELD MEN for McCarthy organization on Richmond housing project include (left to right): Louis Kirk, field foreman, Ted H. Johanns, general superintendent, and Tom Curran, assistant general superintendent.



EIGHT-APARTMENT BUILDING nears completion as hot tar goes up for joints along roofing seams.

NEARLY COMPLETE (below), 12-apartment unit gets exterior finishing touches.



Panama Roads and Bridges **BUILT AT**

Photos, Public Roads Administration



SODDING OF EMBANKMENTS carrying highway in Panama area is necessary to protect earth fills from erosion by heavy tropical rains.



HEAVY GRADING on Rio Gatun-Agua Sucia section of highway is done with American equipment, including carryall scrapers, tractors and bulldozers.

NATIVE LABOR (below) has been trained to operate heavy equipment. Here a MultiFoote paver is placing concrete between steel forms on pavement near Gatun Bridge to provide new traffic link near Panama Canal.



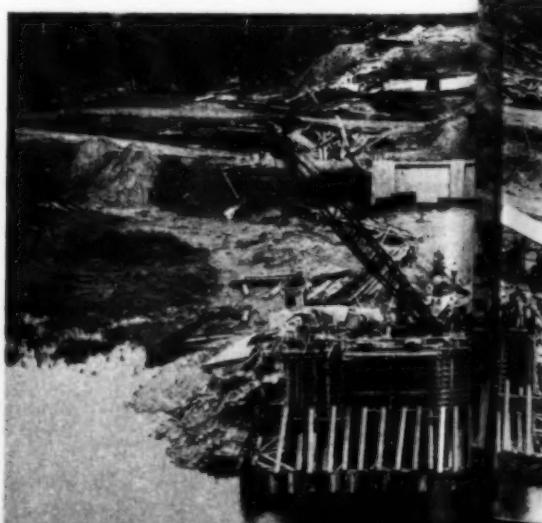
WORKING NIGHT AND DAY the Public Roads Administration of the Federal Works Agency has met the Army time schedule for completion of two highways of great importance to defense of the Panama Canal. Early last year Army officials set a date of June 15 for making the Trans-Isthmian Highway available for military use, and July 1 for completion of the Chorrera-Rio Hato Highway, a section of the Inter-American Highway, giving access to important air defenses for the Canal.

The job of placing more than 50 mi. of concrete surface through the hills and jungles of Panama in six months' time was a big one. Distance from supplies of machinery, repair parts and sources of experienced workmen complicated the problem. Public Roads engineers organized the work for maximum production of all machinery on the two jobs. However, their plans were nearly upset by the weather. The "dry season" in Panama extends from December through April, but last year brought the wettest "dry season" in 20 years. Torrential rains caused many delays in February, March and April. Major construction work in Panama generally stops with the beginning of the wet season in May. Work was pushed ahead in spite of the rains (nearly 3 in. in one 2-hr. period) and both roads were surfaced and ready for military use.

Trans-Isthmian Project

The Trans-Isthmian project extends from near Colon to Madden Dam, a distance of 24½ mi. From there an existing road connects with Panama City at the Pacific entrance to the Canal. Grading of the new

POURING OF CONCRETE PIER (below) for Chagres River bridge is done by crawler crane handling bottom-dump bucket.



AT TOP SPEED TO AID IN DEFENSE OF CANAL

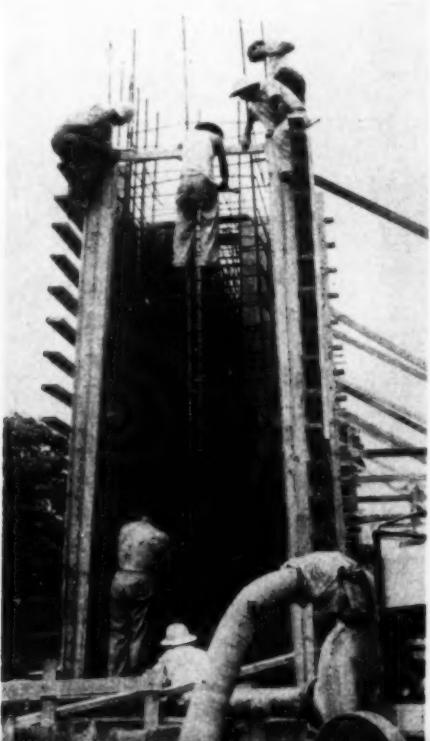


SECTION OF PIER FORM is swung into place by Marion crawler crane.



FOUNDATION PILES of heavy steel H-beams are driven for piers of Chagres River bridge.

STEEL REINFORCEMENT (below) is set within wood form for concrete pier of Chagres River bridge built to carry new highway.



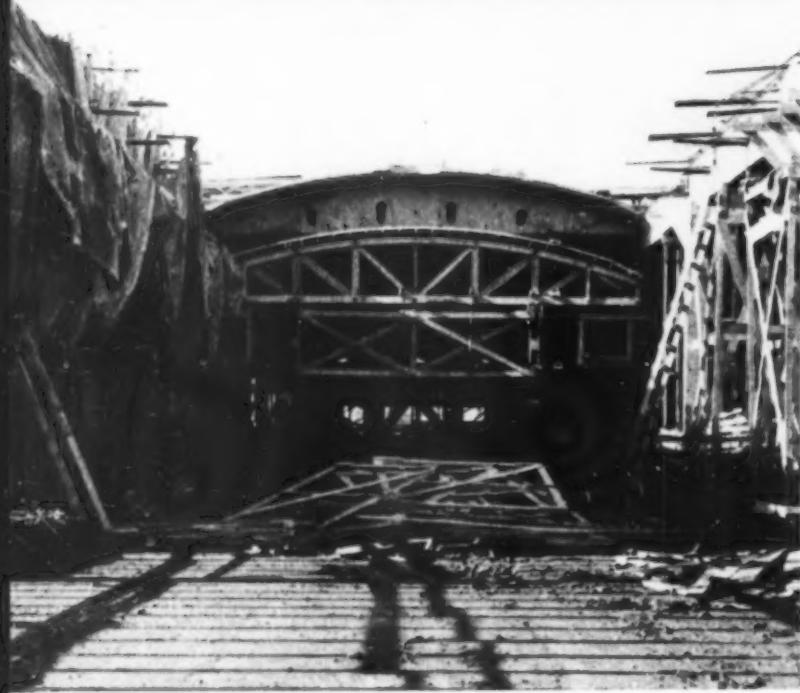
WOOD FORMS (below) for concrete pier of Chagres River bridge are set over foundation piles by crane.



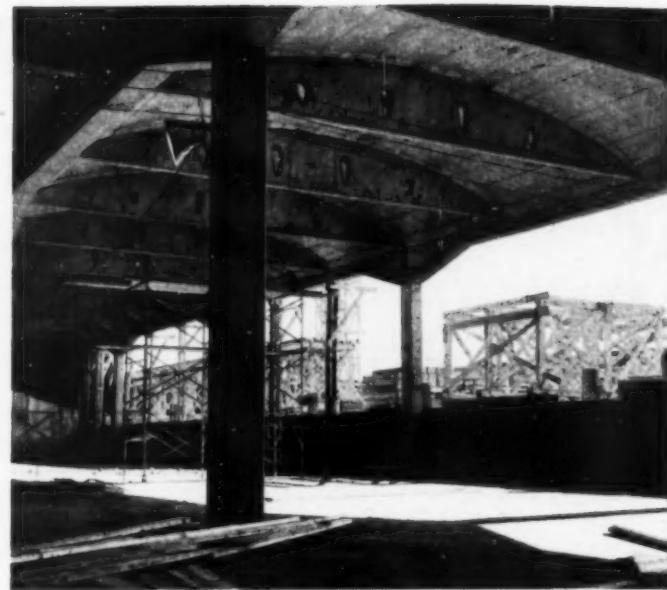
road was largely completed during the dry season of 1941. The surface recently completed consists of two 10-ft. lanes designed to carry the heaviest military vehicles at a speed of 60 m.p.h. Completion of the road adds greatly to the defense of the Canal. Motorized forces at one end of the canal are now quickly available for use at the other end. Formerly, the only means of movement was by railroad or by water through the Canal.

The Chorrera-Rio Hato road was
(Continued on page 105)





MOBILE ROOF FORM. supported on wheels riding on rails, is lowered after concrete arch has been poured. Form is moved ahead 80 ft. and jacked into position for pouring next roof section. Concrete floor slab is laid prior to pouring of roof.



ARCHES ARE STIFFENED on under side by transverse concrete ribs perforated to carry piping and electric ducts for lighting and power.



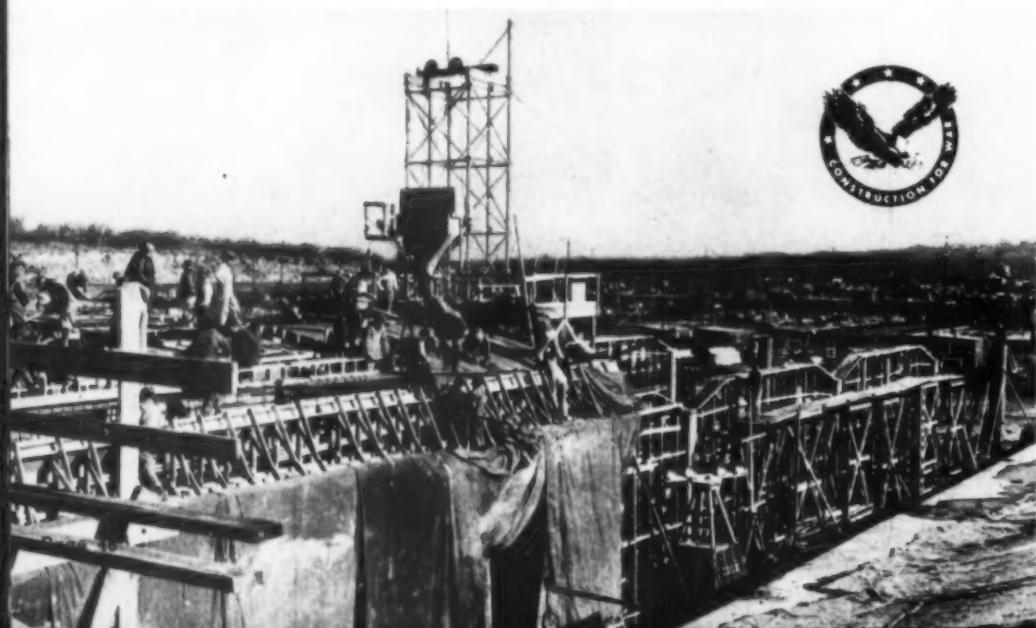
FORMS ARE IN PLACE ready for concrete pour. In background, workers are placing steel reinforcement for arch.

Traveling
Forms
**Build Concrete Roof
Arches by Assembly
Line Methods**

TOWER HOIST (below) raises concrete to point of discharge into hopper from which distribution to roof arch forms is made by two-wheeled buggies moved on plank runways.

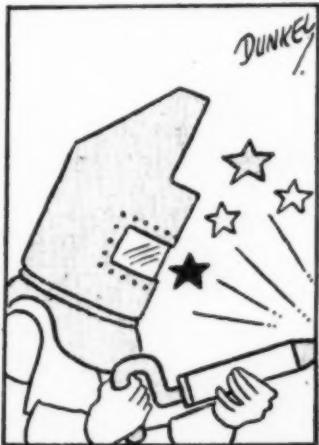
TRAVELING FORMS in 80-ft. lengths, wheel-mounted to ride on rails and equipped with jacks for raising and lowering, constituted the key equipment for constructing, by assembly line methods, a series of concrete barrel arches forming the roof of the huge new Pratt & Whitney aircraft engine plant located somewhere in the Middle West. Built by the Long-Turner Construction Co. from designs by Albert Kahn Associated Architects and Engineers, of Detroit, the one-story reinforced concrete structure covers an area large enough to provide gridirons for the simultaneous playing of 70 football games. A feature of the design, in which the

(Continued on page 122)





"Mr. Spring, what are you building up to?"



Drawn for Office of War Information



"It's because we got to speed up these war construction projects."



IF CHICAGO WERE BOMBED Bureau of Engineering of City's Department of Public Works, under direction of W. W. DeBerard, city engineer, is organized and equipped to repair quickly any damage done to municipal water supply system. For exhibit at City Hall a scale model, illustrated herewith, was prepared to show how this emergency work would be handled in event of hit on one of Chicago's pumping stations. Truck-crane removes debris, while loads of heavy timbers and cast-iron pipe are rushed to scene. At right, equipment for chlorinating water is placed in service.

Photo, Cast Iron Pipe News



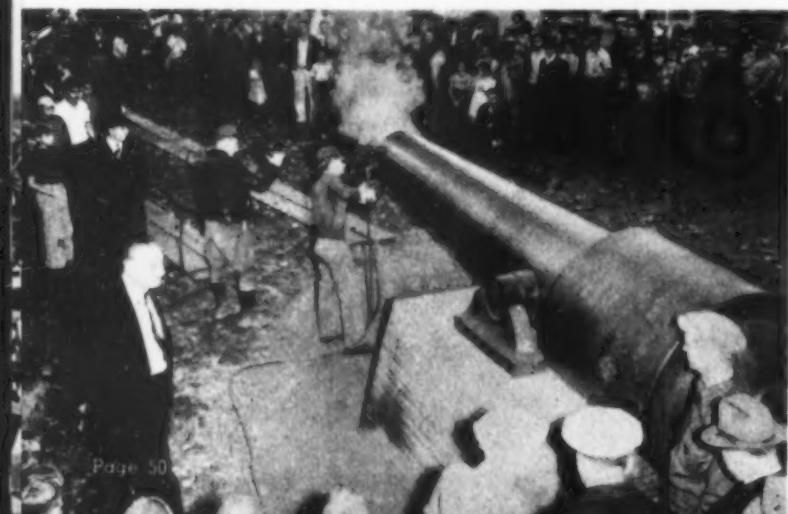
HUMAN SWAB, prone on wheeled carriage, passes through section of 24-in. welded steel oil pipe line to clean interior and remove small animals or other obstructions that would impede flow of petroleum products before line is placed in service.

Wide World Photo



FLOATED DOWN RIVER ON BARGE full-sized timber railway bridge, rendered useless by location on Kettle River in area flooded by rising waters of reservoir created by Grand Coulee Dam in Washington, makes 112-mile trip to point near dam where structure could be economically dismantled and its 100,000 b.t. of lumber salvaged. Bridge erected by Great Northern Railroad in 1902 consisted of two Howe truss all-timber spans (one of which is illustrated herewith), one 68 ft. long weighing 90 tons and other 151 ft. long weighing 210 tons. In one day crew of 14 men transferred bridge spans to two barges and two days later structure had completed its river trip. Salvage value of still serviceable timbers of bridge was estimated at \$15 per 1,000 b.t.

SAVAGED FOR SCRAP (below) is this 15-ton Civil War cannon of Swedish gray iron donated in drive by City of Cedar Rapids, Ia., and cut apart with oxyacetylene torches by operators from LaPlant-Choate Manufacturing Co., producers of earth-moving equipment. Truck-mounted crane delivered cut pieces of old cannon to local salvage depot for shipment to steel mill.



Page 50

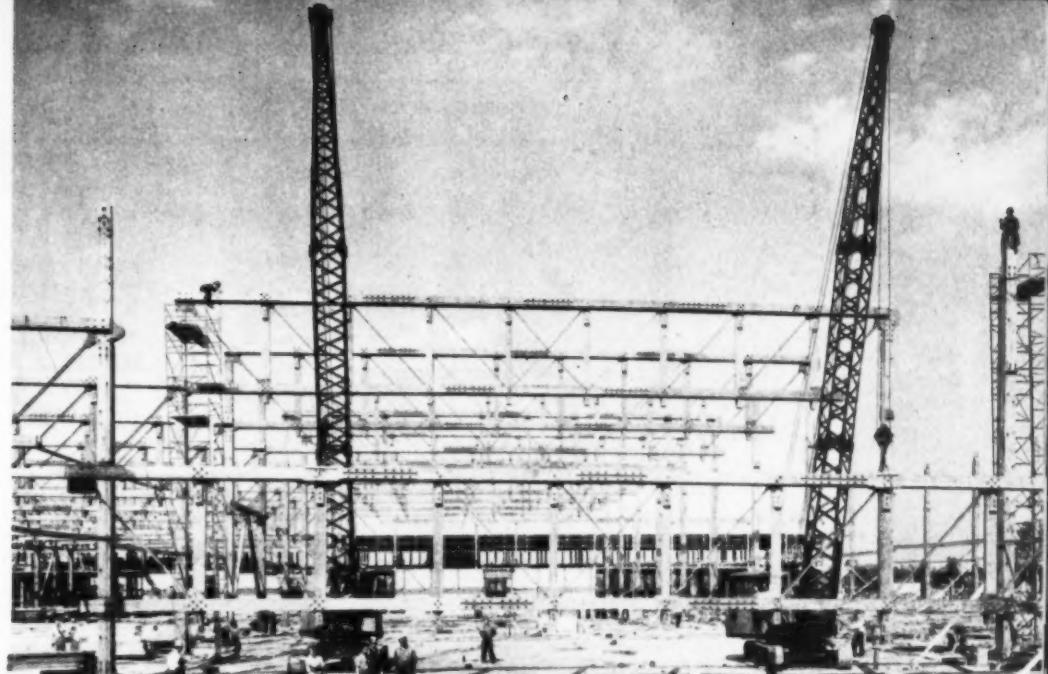
TOP ODDITIES

OLD AND NEW MODES OF TRANSPORT (below) are here seen on a military highway in India. Alongside modern motor trucks caravan of camels beasts of burden since time first began to tick, is drafted to carry military supplies for war effort. Photo was taken by U. S. Army Signal Corps.



Wide World Photo

More Daylight For Timber-Frame Aircraft Factory



PREFABRICATED TIMBER TRUSS of 99-ft. span is raised by pair of crawler cranes for erection of laminated timber columns. Steel rod diagonals are used in these trusses to admit more light to interior of aircraft factory from windows of sawtooth roof.

TWO FEATURES OF SAWTOOTH ROOF CONSTRUCTION improve the volume of natural light delivered to the production floor of a large timber building recently completed for an aircraft plant in eastern Canada. To reduce obstruction to the passage of daylight, main roof trusses in front of the sawtooth windows employ steel rods instead of timber members for the diagonals. As a further factor, the sloping wood roof decks facing the windows are covered with white cement shingles which reflect additional light into the building. Prefabricated structural timber was used for framing, and connections were made with Teco timber connectors.

Main trusses of 99-ft. span support the sawtooth roof framing over eight bays across the building. These trusses rest on columns spaced 30 ft. apart in the other direction. Sawtooth framing is connected into the main trusses at the panel points, 11 ft. apart, c. to c. Verticals of the main trusses were extended below the lower chords and were dapped to provide for connection to the horizontal members of the sawtooth framing, as illustrated.

In the main trusses, top and bottom chords consist of two 6x14-in. timbers, and the verticals are 6x10 to 6x14-

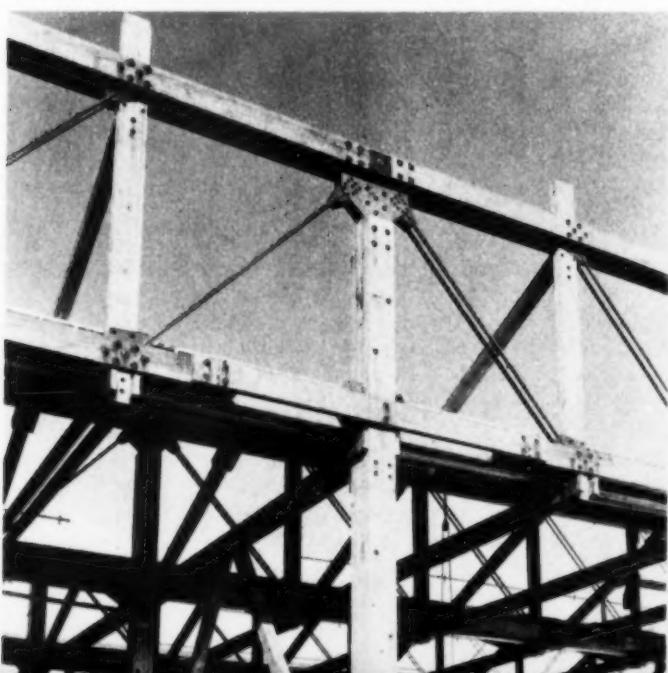
in. pieces framed between the double chord members. Each diagonal is a pair of square steel rods welded to slotted gusset plates which have flanged shear plates welded to them for connection to the timber truss members. Wood-to-wood connections are made with split ring connectors and bolts.

Laminated columns made up of one 7x16-in. piece and two 6x16-in. pieces were fabricated with split rings and bolts. The columns extend to the upper chords of the trusses, which are spliced at this point, as shown by one of the photographs. Unsupported height of the columns is 22 ft. except in one part of the factory where the clearance is increased to 35 ft.

Douglas fir for the structural frame, which required more than 1,000,000 b.ft. of timber, was prefabricated at a West Coast plant and shipped to the job marked for assembly and erection. The erectors used more than 100,000 timber connectors.

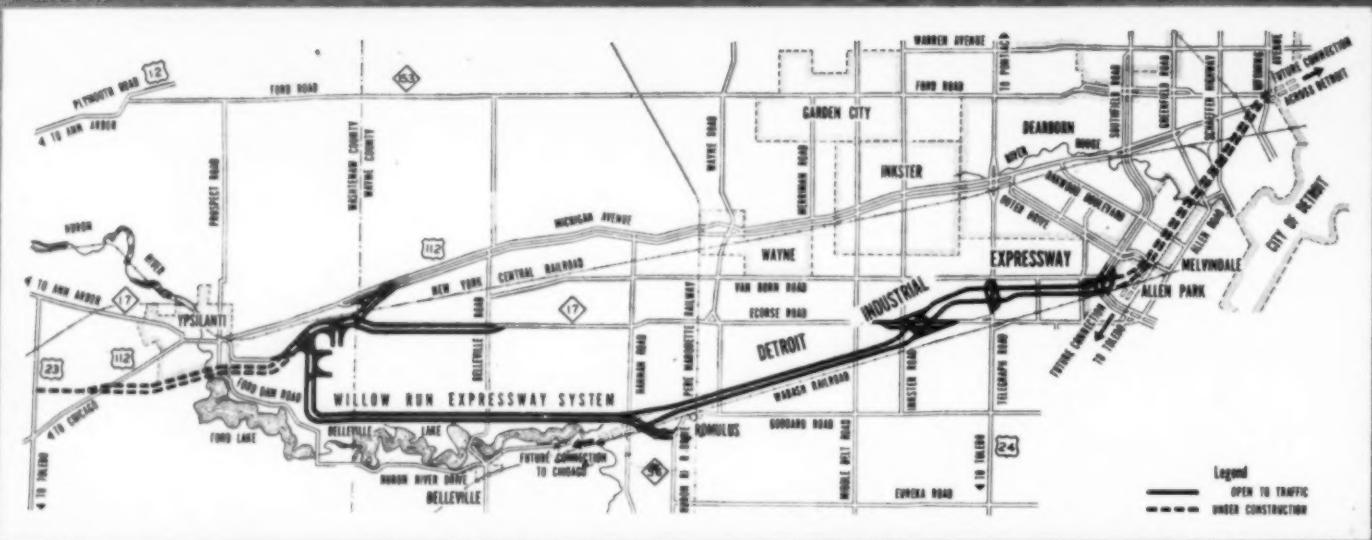
Three Montreal firms participated in the work. L. G. Ogilvie & Co., Ltd., were the contractors, T. Pringle & Son, Ltd., were the engineers and architects, and Canada Creosoting Co., Ltd., fabricated the trusses.

TOP CHORD CONNECTION of trusses to column is made with steel gusset plates bolted to middle piece of three-part laminated post.



SAWTOOTH ROOF FRAMING supported by main trusses carries 3-in. spruce deck covered with white asbestos cement shingles to reflect additional light. Window sash of sawtooth roof is set on outside of main trusses, between upper and lower chord members.





Speed and Steel Saving

FIRST COMPLETED SECTION of Detroit Industrial Expressway is vital 11-mi. link connecting previously opened access system serving war plants with suburban highways just west of city limits. Second section planned for early construction will extend continuous freeway to point inside city line.

Mark Construction by 20 Contractors of Expressway for Detroit War Industries



SMOOTH BATCHING OPERATIONS please J. H. McCARTHY (left), metropolitan engineer, on visit to plant of J. W. HOBECK, who does the paving on contract of Louis Garavaglia & Son.

TO PROVIDE at the earliest possible moment a direct connection between Detroit and a previously completed access road system serving huge war industries to the west of the city, the Michigan Highway Department and twenty collaborating contractors operating on a total of 40 contracts

concentrated a mass of construction equipment on the first 11-mi. section of the Detroit Industrial Expressway with the object of opening this vital link to traffic by Christmas of last year. Nineteen bridges (at ten grade separations) and more than 400,000 sq.yd. of concrete pavement in divided roadways make this section a continuous freeway of the most advanced type, in keeping with plans proposed for future construction on other sections of the expressway. The grade separations divided the project, which involved a total construction cost of more than \$5,000,000, into a number of natural construction sections, and these smaller units were utilized by the highway department as a basis for writing contracts, thus interesting a large group of bidders and drawing a big volume of equipment on to the job.

Contracts for the various units were awarded as fast as plans could be completed and approved. The first grading and paving contract took effect on May 7, and the last on Aug. 27, 1942. Corresponding dates for the first and last bridge contracts were May 19 and Sept. 2.

To conserve one of the nation's critical war materials, not a single pound

of steel was used in the concrete pavement, which was designed as 9-in. uniform-thickness slab without reinforcement, tiebars or load-transfer devices at expansion joints. Two-lane roadways 24 ft. wide were paved to full width, with a longitudinal, centerline joint of the grooved type cut 2½ in. deep into the fresh concrete and filled with premolded ribbon. Transverse expansion joints 1 in. wide, without dowels or other load-transfer devices, were installed on 120-ft. spacing, and plane-of-weakness contraction joints 2½ in. deep containing strips of premolded bituminous filler were inserted at 20-ft. intervals between them. The pavement was laid on a subgrade of pervious sand-gravel.

Steel for reinforcement was used only in the grade-separation bridges and in drainage structures, such as sumps and pump houses needed for drainage from the depressed underpasses at intersecting roads beneath the bridges. At every grade separation but one, two bridges carry the dual roadways of the expressway across the intersecting route. Four of the grade separations were constructed with connections between the expressway and the intersecting road for interchange of traffic.

DETROIT INDUSTRIAL EXPRESSWAY—SECTION 2

The bridges, of reinforced-concrete beam design, have two features which are out of the ordinary. Carrying out an idea which has long been in the minds of Michigan's two most recent state highway commissioners, Murray D. Van Wagoner, preceding his term as governor of the state, and G. Donald Kennedy, later incumbent, the bridge decks are made wide enough to carry the full roadway width, including shoulders. All expressway bridges have a clear width between guard rails sufficient to accommodate the traveled way and two 12-ft. shoulders. Ordinarily the clear width is 48 ft., but at four interchange locations the bridge decks are made 60 ft. wide between guard rails to provide an additional 12 ft. for acceleration and deceleration lanes. The 12-ft. shoulder width is made up of a 15-in. rolled curb and 10 ft. 9 in. of special cinder concrete having a color and texture different from the deck pavement in the traveled way. This feature is in-

ROAD CONTRACTS		
Contractor	No. of contract units	Value of contracts
Julius Porath & Son Co., Detroit, Mich.	6	\$771,540.84
Charles J. Rogers, Inc., Detroit, Mich.	4	700,798.63
Louis Garavaglia & Son, Detroit	2	549,932.57
Taylor Bros., Birmingham, Mich.	3	508,539.11
Loselle Construction Co., Wyandotte, Mich.	3	249,237.28
Ray Sablain, Lansing, Mich.	2	243,301.98
Ed. Closser, Detroit, Mich.	1	28,111.98

BRIDGE CONTRACTS		
Contractor	Types of construction	Value of contracts
L. A. Davidson, Lansing, Mich.	3 Grade separations	\$693,017.45
Peninsular Const. Co., Grand Rapids, Mich.	2 Gr. sep's., 2 pumphouses	330,677.88
John W. Hertel, Grand Rapids, Mich.	Grade separation	211,761.30
D. T. Frank, East Lansing, Mich.	1 Gr. sep., 1 pumphouse	150,677.78
E. J. VanderVeen, Grand Rapids, Mich.	Grade separation	139,833.00
W. J. Storen Co., Detroit, Mich.	Grade separation	109,208.65
Waterway Const. Co., Detroit, Mich.	Sewer	92,969.50
Andrew Barnes, Cass City, Mich.	Grade separation	88,233.50
Couse & Saunders, Detroit, Mich.	Pumphouse	72,429.58
Bethlehem Steel Co., Detroit, Mich.	Steel	34,946.78
Fry & Kain, Lansing, Mich.	Pumphouse	33,316.40
Walter Toebe & Co., Lansing, Mich.	Bridge railings	25,383.72
Getman Bros., South Haven, Mich.	Pumphouse	22,767.70



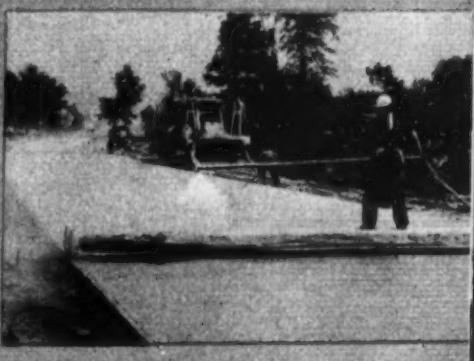
ENGINEERS IN CHARGE of construction on Detroit Industrial Expressway meet representatives from Lansing headquarters. (Left to right): A. J. ROUSSEAU supervising bridge engineer; HOMER CASH, assistant road construction engineer; J. H. McCARTHY, metropolitan engineer; H. J. BRIGHTON, project engineer on paving contract; C. H. Brown, assistant metropolitan engineer; H. J. CONROY, engineer on special assignment, and J. G. SCHaub, assistant chief engineer.



PLACING CONCRETE on connecting road at interchange. 34E paver departs from ordinary practice by traveling on subgrade between forms. Typical equipment consisting of two-screed finisher and joint machine follow paver. Behind these machines, spray apparatus on rolling bridge applies liquid sealing membrane to finished concrete surface.



FINEGRADING MACHINE (left) traveling on forms trims subgrade to desired depth for pavement. Ahead of subgrader, tractor and roll-over scraper remove excess material from between forms.



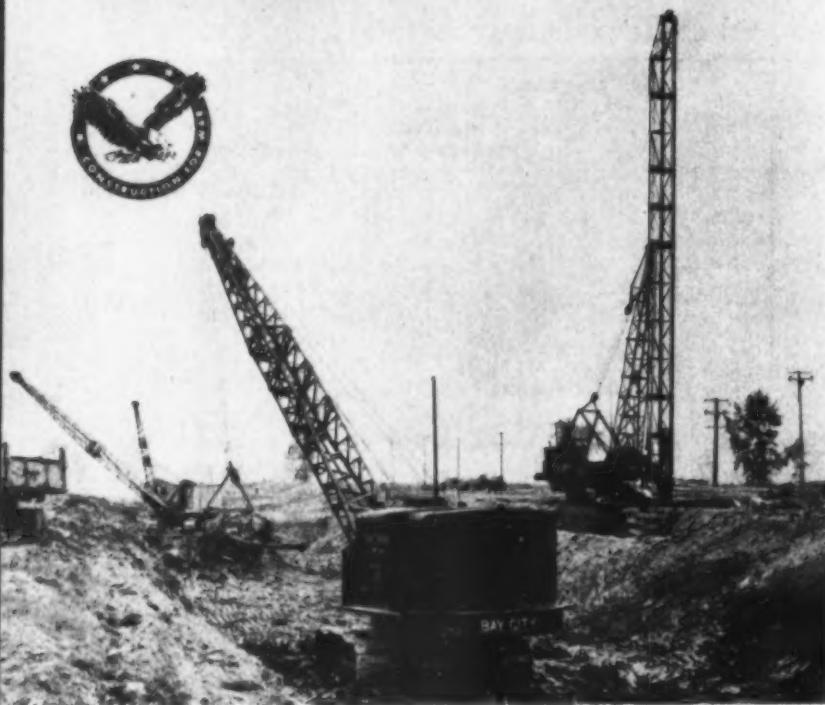
LIQUID SEALING COMPOUND (right) sprayed on slab surface forms transparent membrane preventing moisture loss during curing period. Red dye in compound fades out, leaving colorless seal.

DUAL-DRUM PAVER (below, right) of 34E size carries 1,400-gal. reserve tank to maintain continuous supply of mixing water while tank trucks are being changed.



NON-REINFORCED PAVEMENT (left) of 9-in. uniform thickness is placed to full 24-ft. width by 27E paver traveling outside forms. Expansion joint containing no steel for load transfer is supported between boards on subgrade until concrete can be deposited on both sides of joint.

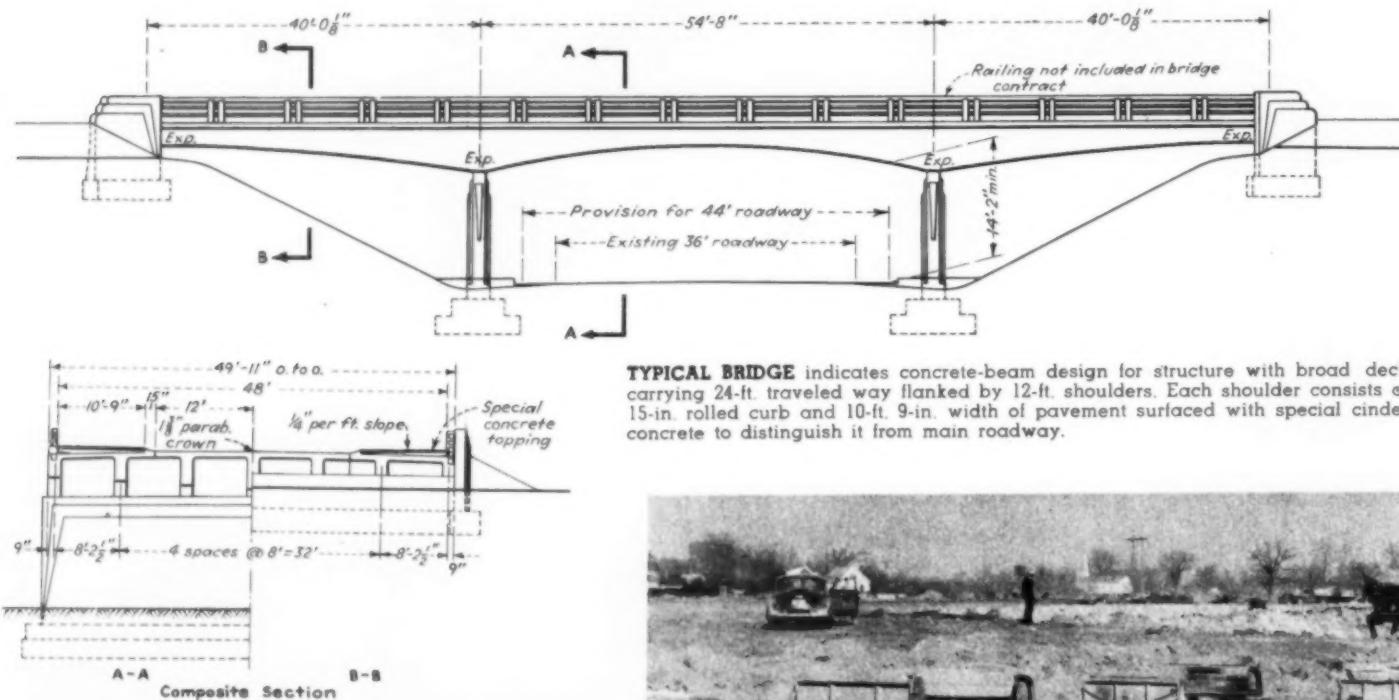




BATTERY OF DRAGLINES digs stiff clay for grade separation at one of two locations requiring pile foundations for bridges.



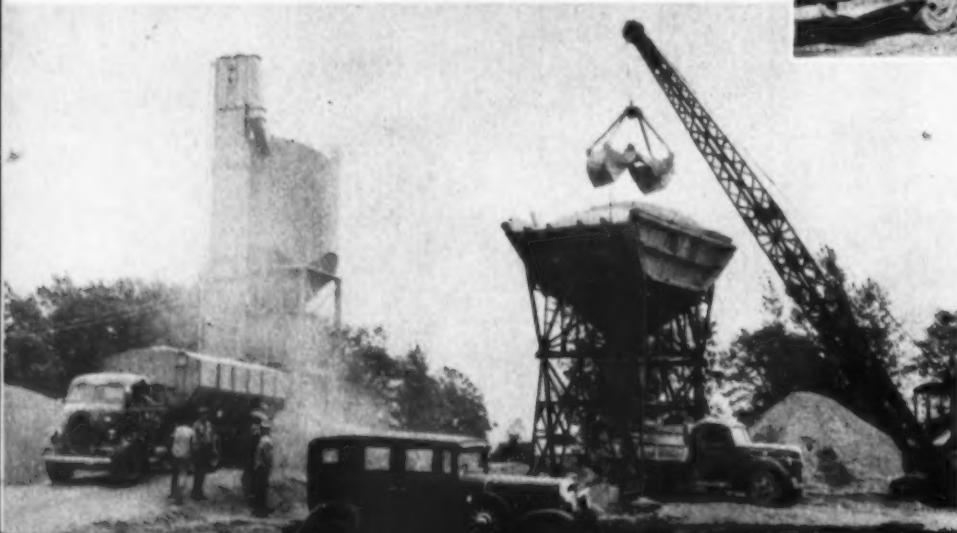
CLAY KNIFE pulled by cable to dragline drum slices heavy clay in pit excavated to exact dimensions for bridge pier footing.

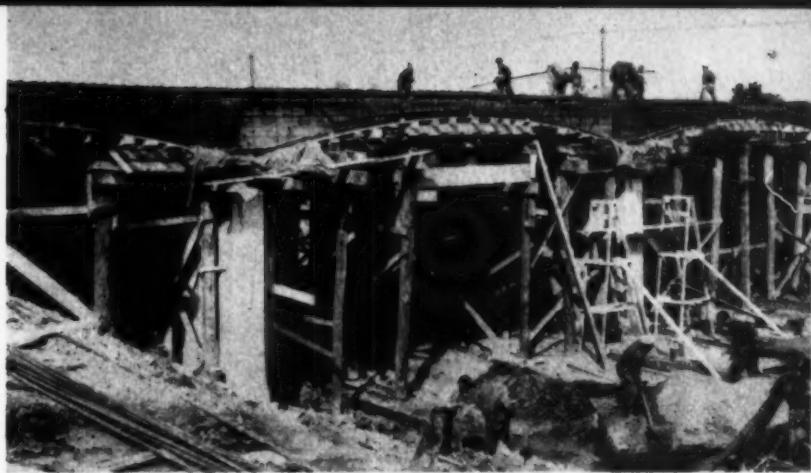
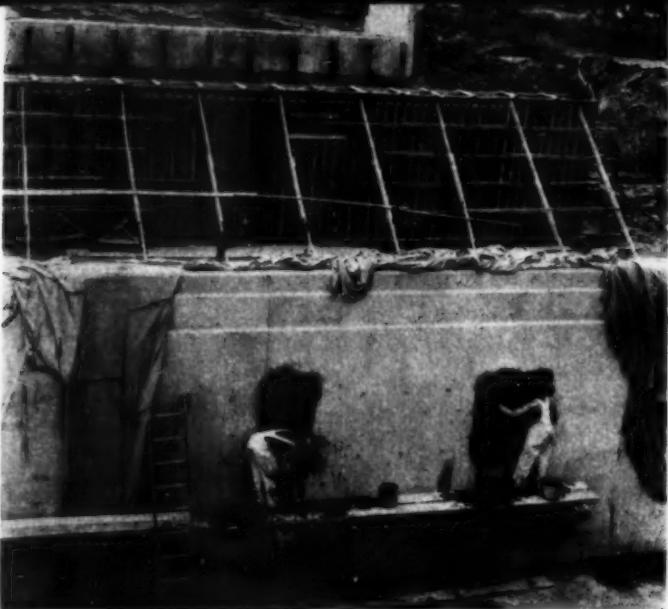


BATCHING PLANTS (below) of paving contractors are equipped to handle bulk cement delivered by self-unloading trucks. All aggregates are truck-hauled to batch plants and are loaded by cranes out of stockpiles into bins.



TYPICAL JOB (below) on grade-separation bridge crossing depressed intersecting road makes use of truck mixers to deliver concrete, here being placed on deck.





PLYWOOD PANEL FORMS (left) are used by most bridge contractors for both substructure and superstructure. Finishers rub concrete pier cured under wet burlap.

BEAM REINFORCEMENT is placed by steel setters in outer beam before form is closed. Driven wood piles support beam and deck forms.

dicated in an accompanying section of a typical bridge. As a second feature, the expressway bridges are decorated by a pleasing V-for-victory motif on the abutment pylons and piers.

Industrial Expressway—For its entire length the Detroit Industrial Expressway is to be a continuous freeway, without a single traffic light or intersection at grade. Need for the freeway in the battle of production on the home front was established by careful engineering studies, including an accurate survey of the labor reservoir in the metropolitan area, based on a residence census of workers employed in the principal industrial districts. Work on the present section was undertaken first because this section is a vital link between the city and outlying industries to the west. Construction of the 11-mi. link received full federal approval, granted

(Continued on page 106)

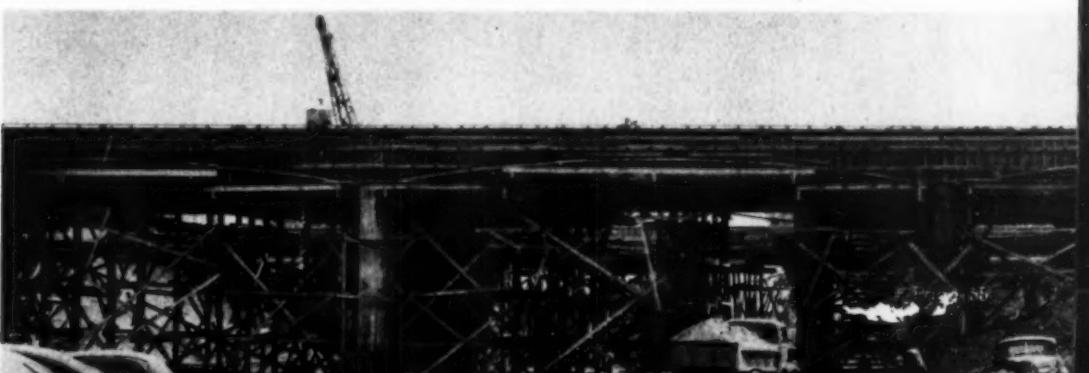


INTERCHANGE ROADS between depressed intersecting route and expressway serve as temporary traffic detours during construction of bridges and paving of underpass.



BROAD DECKS of expressway bridges provide 48-ft. clearance between guard rails. Rolled curbs and shoulders 12 ft. wide flank 24-ft. traveled way. Heavy approach fills carry expressway roads up to these two high-level bridges crossing railroad and highway at one intersection.

TIMBER FALSEWORK PILES (below) supporting beam and deck forms for high-level crossing over railroad and highway are typical of temporary falsework for all bridge jobs on project.



SAND BORROW PITS supply excellent material for embankment construction on Detroit Industrial Expressway and on access road system with which expressway connects.



Present and Accounted For... A PAGE OF PERSONALITIES



TVA ENGINEERS direct Douglas Dam construction on record-breaking schedule to provide additional electric power for Tennessee Valley's war production plants. Left to right are: THOMAS F. TAYLOR, construction engineer; LEE G. WARREN, project manager (also project manager for recently completed Cherokee Dam); J. S. LEWIS, JR., construction superintendent, and J. W. CLARKE, assistant construction engineer.



CHARLES H. PURCELL has been named state director of public works for California, succeeding Frank W. Clark. From 1927 until he took over this important post, Mr. Purcell was state highway engineer of California. He was also chief engineer, San Francisco-Oakland Bay Bridge.



DETINNING FACTORIES for salvaging tin and steel scrap will be constructed in 29 metropolitan areas under direction of **WELLS N. THOMPSON**, who has recently been made manager of this project by the H. K. Ferguson Co., industrial engineers and contractors of Cleveland, Ohio.



WARDNER G. SCOTT, state engineer of Nebraska, was elected president of Association of Western State Engineers at their 15th annual convention recently held in Denver.



BRADY GENTRY, chairman of Texas Highway Commission, was elected president of American Association of State Highway Officials at the association's 28th annual meeting held last December in St. Louis.



LLOYD B. REID succeeds G. Donald Kennedy as state highway commissioner of Michigan. Mr. Reid joined the State Highway Department in 1933 and at present is secretary of the Michigan Engineering Society.



A. G. C's National Officers for 1943

OSCAR B. COBLENTZ of Baltimore (left) and **WILLIAM MUIRHEAD** of Durham, N. C. (right) take office this month as president and vice-president, respectively, of the Associated General Contractors of America. Mr. Coblenz was vice-president of A. G. C. during 1942, and since 1916 has been president of McLean Contracting Co. of Baltimore. Mr. Muirhead is president of Wm. Muirhead Construction Co., Inc., a company he founded soon after his arrival in this country from Scotland in 1923.





Tools in Expert Hands

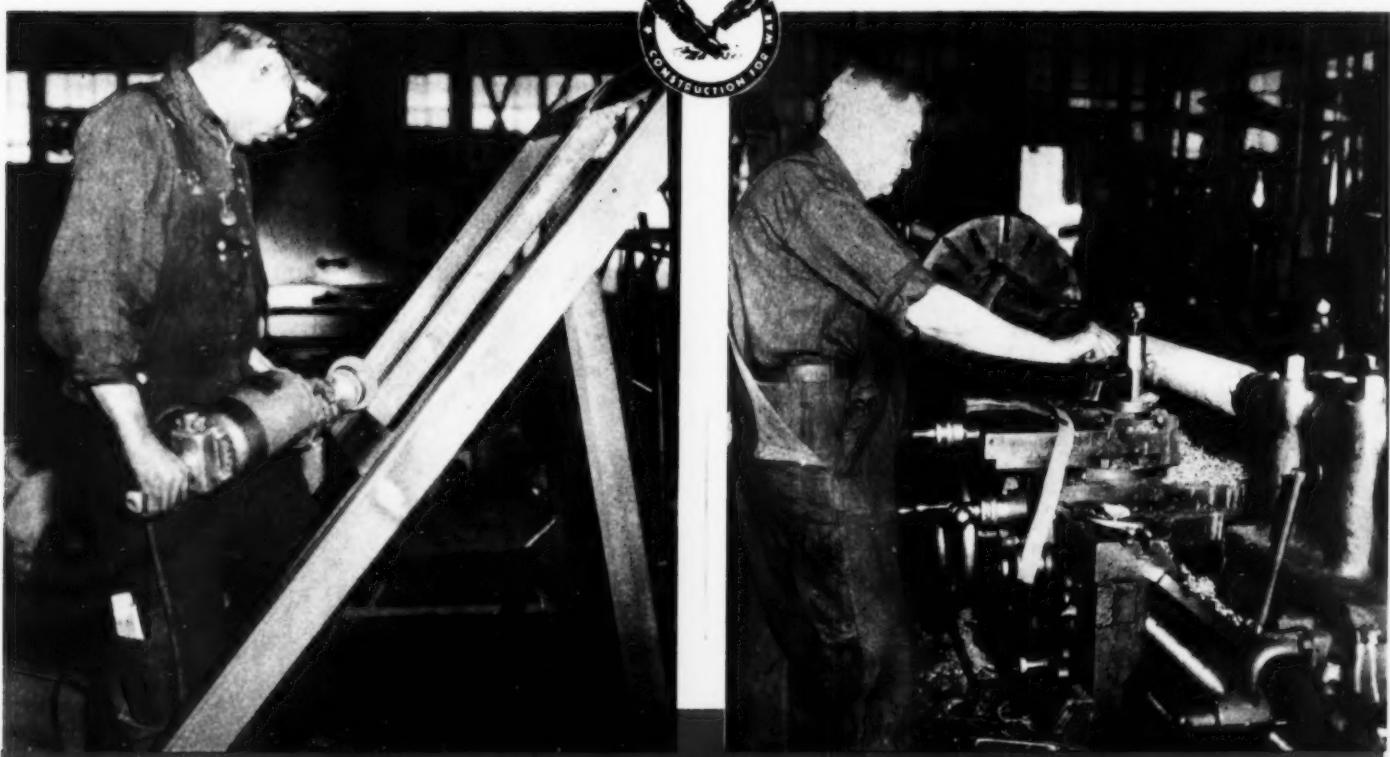
RESTORE USED EQUIPMENT

FOR HARD SERVICE

ON WAR CONSTRUCTION

PORABLE HONE powered by Van Dorn electric drill (110 v., 6 amp., 225 r.p.m., $\frac{3}{4}$ -in. drill capacity) polishes rebored cylinders in engine shop. Sunnen hone and stones are used also to clean brass bushings when necessary in contractors' equipment shop

PHYSICALLY FITTED AND CAPABLY STAFFED for the task by twelve years' experience in equipment rebuilding, the well-tooled shops of L. B. Smith, Inc., Camp Hill, Pa., a few miles from Harrisburg, are today giving expert service in reconditioning worn and damaged construction machines sent to them by war contractors and by the Corps of Engineers, U. S. Army. No makeshift job is turned out by the shops; every machine that comes in for rebuilding is completely disassembled, and all structural and mechanical parts are cleaned, inspected, and restored to original dimensions before the machine elements are reassembled. The shops are tooled to perform any rebuilding or reconditioning operation required on construction equipment, and the rejuvenated machines are reassembled to working tolerances as close as, or closer than, those originally specified by the manufacturers. Ability of the organization to do expert work has been recognized by the Mechanical Equipment Division, U. S.

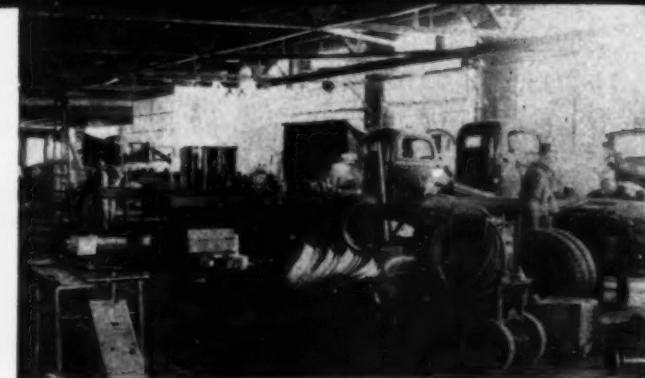


WELDED MOTOR STAND for bucket elevator is ground smooth with Norton abrasive disk on Stanley electric grinder.

AFTER BEING BUILT UP by electric welding, shaft from Lorain 77 shovel is machined to original dimensions on Reed-Prentiss 24-in. by 12-ft. geared head lathe driven by Allis-Chalmers 5-hp. motor.



10-TON MOTOR GRADER, Caterpillar Model 12, is lifted by 20-ton-capacity bridge crane into position for "drive-away" after being rebuilt in shop.



BUSY TRUCK SHOP builds 40 Ford chassis into Smithco trucks in 17 days, in addition to regular truck rebuilding and repair work. For Smithco unit, chassis is rebuilt into 18,000-lb.-capacity truck with double frame made by pressing second frame running up under cab on to original frame members and riveting. Springs are built up. Eaton two-speed rear axle is put on, and vacuum booster power brakes are installed. Body is Daybrook rear-dump powered by fast-acting Daybrook Speedlift hydraulic hoist.



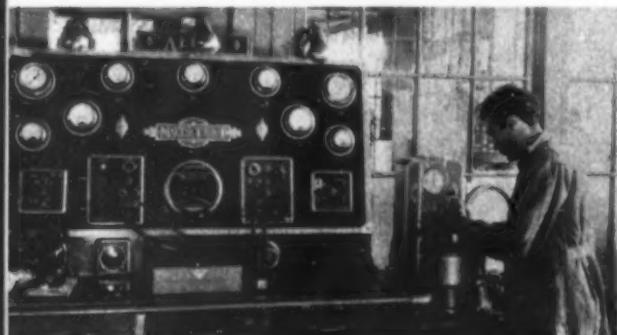
SHORT JET NOZZLE projects steam-acid spray in cleaning grease and dirt from Mack truck. Both steam and acid lines to cleaning hose are under 80-100-lb. pressure.



WORN SCARIFIER TOOTH, after being heated in forge, is shaped by blacksmith operating Beaudry trip hammer powered by G-E 5-hp. motor.



BOLT HOLES of 15/16-in. diam. are bored by Thor pneumatic drill positioned under radial bar on skid frame being manufactured for large-capacity diesel-electric set combining Murphy diesel engine and Ideal generator.



ELECTRICAL TESTING DEPARTMENT uses Allen Moto-Test stand to check all electrical accessories, such as starting motors, generators, distributors and magnetos. This department rebuilds faulty accessories and also services air brakes, both by testing them and by correcting defects.

Engineers, which has commissioned L. B. Smith, Inc., to rebuild any equipment dispatched to its shops by the Army Engineers.

Historically, the Smith establishment goes back farther than its twelve years as a rebuilders of equipment. The original company started as a truck shop in 1918-19 and stayed exclusively in this business until 1930, when it branched out into the buying and rebuilding of construction equip-

ment. Until 1934, the business remained in one building. In that year, the company erected a new building for its equipment shop, parts department, and offices. Another unit to house the equipment rebuilding shop and the machine shop was erected in 1937. The last addition to the plant, put up in 1939, is a bridge craneway 600 ft. long, covered for 200 ft. at one end by a steel-frame structure. This crane reclaims material from a

SHOVELS FROM 1/2- TO 2-YD. SIZE (below) are included in this group, rebuilt by construction equipment department which performs all classes of repair and rebuilding work required to restore machines to first-class condition for full-capacity service.





AIR-POWERED IMPACT WRENCH and track-pin press are kept busy on disassembling and rebuilding of crawler tracks in tractor repair section of equipment shop.



FOR HOSE CLEANING of equipment, steam and cleaning solution are mixed at pipe union before entering hose. Valves on two pipes at right control flow of steam and acid; steam pipe is in center.



LONG-JET PIPE for steam-acid stream cleans rotor assembly from supercharger of Murphy diesel engine. Acid solution consisting of 1 lb. of Magnus 94E to 4 gal. of water is blended with steam at pipe junction shown at left.



HEATED WHITE HOT in about 20 sec. by American Car & Foundry electric Berwick metal heater, 7/16-in. rivets 2 in. long are passed to workmen building trucks in shop which also takes care of truck repairs.



LARGE DRILL powered by 1/2-hp. electric motor is more satisfactory than 1/4-hp. unit (photograph farthest to right) for cleaning carbon from valve ports with wire brush, as work goes faster and is easier on drill.



WIRE CARBON BRUSH is used temporarily on Thor 1/4-hp electric drill to clean carbon out of valve ports in cylinder head of White 7A truck engine. Larger drill, shown by photograph at left, is preferred for this work.

60x600-ft. dead storage area in which salvaged machines and metals are piled until needed. Total shop floor space today is more than 80,000 sq. ft.

At present the company employs 600 workers in its various operations, which take in several concrete aggregate plants, a heavy hauling service and a motor vehicle sales division in addition to the construction equipment department. The last-named department has about 280 employees.

of whom 250 work in the shops on a regular schedule of 9 hr. a day, six days a week. Exceptions to the regular schedule are to be found in certain shop units, such as metal spraying, which is kept busy 24 hr. a day.

In its shops, the construction equipment department rebuilds completely shovels, draglines, cranes, tractors, trucks, trailers (both flat-bed and dump), locomotives, diesel and gasoline engines, electric motors and gen-

eral Motors injectors and Cummins fuel pump. Caterpillar and Murphy diesel fuel injection systems are taken care of elsewhere. For every diesel engine disassembled in shops, diesel fuel injection system is taken down and tested.

TURNTABLE FRAME (below) of Lorain 75B shovel is disassembled with aid of Blackhawk box socket wrench fitted with pipe extension handle for greater leverage. Complete repair and rebuilding job requires that entire machine be taken down.



ELECTRIC WELDING OPERATOR drawing power from Lincoln generator puts finishing touches on loading baffles for belt conveyor equipped with Iowa Mig. Co. grease-packed anti-friction idlers that require no greasing.



PAINT IS SPRAYED (below) on plate housing of Buffalo-Springfield roller with De Vilbiss gun. Workman holds cardboard shield to protect lower part of machine.

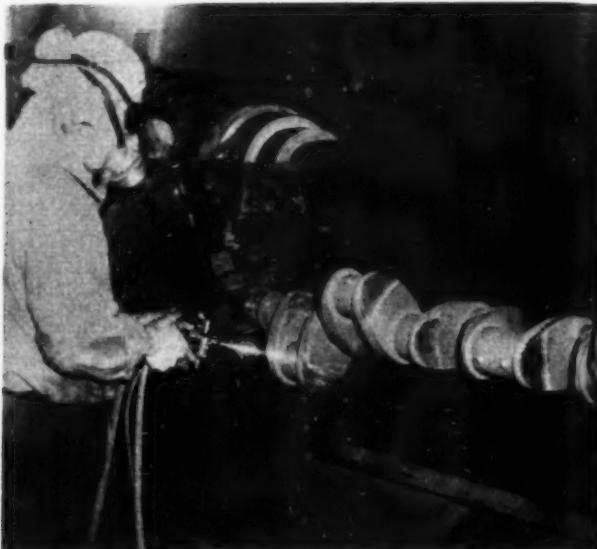




EQUIPMENT PARTS of moderate size like this transmission are cleaned by boiling for couple of hours in acid bath containing 1 lb. of Magnus 94R cleaning compound to every 4 gal. of water. Jet holes in steam pipes at two sides of tank (about 5x10 ft. in size) are turned at angles to project parallel jets causing solution to rotate in tank. Holes in pipe at ends of tank throw horizontal jets.



ELECTRIC - MOTOR - DRIVEN MACHINE with variable speed control travels on track while gas torch cuts beveled edge on plate for diesel-electric generator set. Airco machine provides adjustment of torch cutting angle up to 45 deg.



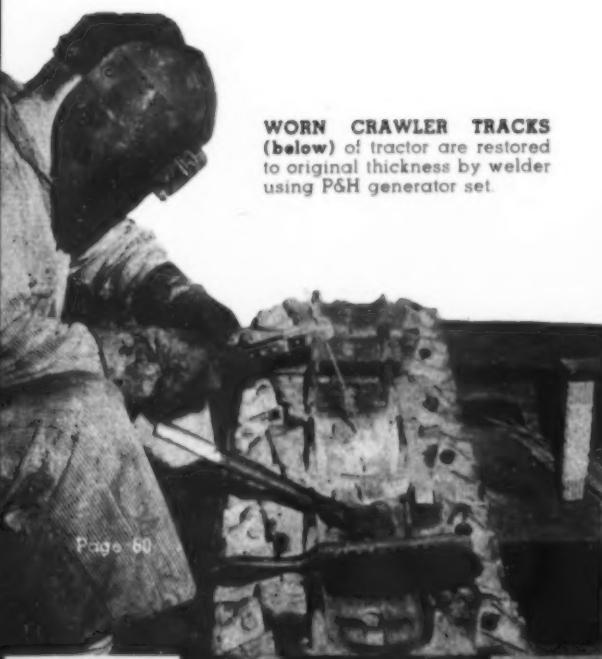
METAL SPRAY GUN builds up worn crankshaft of Caterpillar D8 tractor. Mogul gun powered by air turbine draws Spraysteel 80 11-gage wire from horizontal reel, melts metal in annular oxyacetylene flame and projects fine spray on to worn bearings. Job of this kind may take 16 to 18 hr., more than three-fourths of time being used for spraying, with short intermissions of 15 to 20 min. to let sprayed shaft bearings cool.



EQUIPMENT REBUILDING by L. B. Smith, Inc., is under direction of **EDWARD A. WOLFORD**, acting manager, construction equipment department.



CONTRACTORS EQUIPMENT SHOP operates smoothly under capable supervision of **ARTHUR CRAIG**, superintendent.

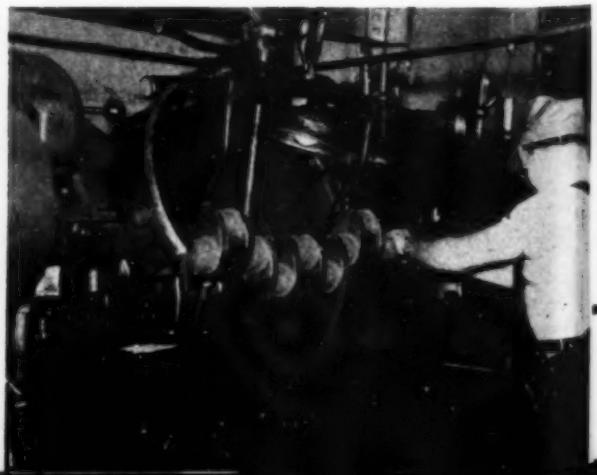


WORN CRAWLER TRACKS (below) of tractor are restored to original thickness by welder using P&H generator set.

BEFORE BEING SPRAYED (below) with steel by metallizing gun, worn crankshafts are blasted with steel grits by Pangborn grit-blasting equipment in this shed to roughen bearings for bond with sprayed metal. Crankshafts are supported in adjustable trunnion, one end of which can be seen.

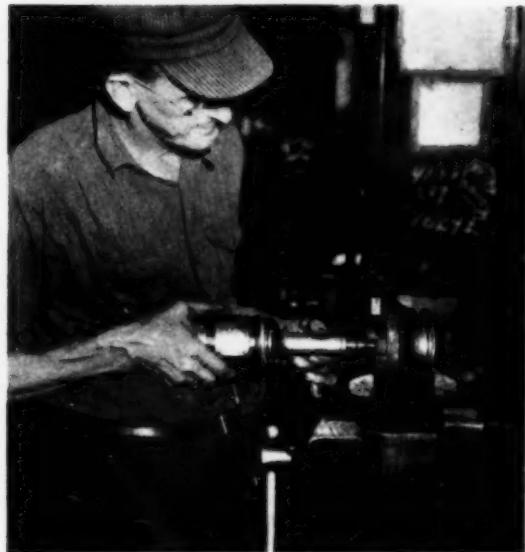


AFTER BEING SPRAYED (below) with steel by metallizing gun to rebuild worn bearings, crankshaft of Caterpillar R4 tractor is set up in Landis 22x72-in. crankshaft grinder (capable of turning 11-in. throws) to be machined to original dimensions. When properly bonded, sprayed and machined, bearings built up by metallizing frequently give longer wear than original part.





DRY SLEEVES have been installed with electrically powered vertical press in rebored 6-in. cylinders of Waukesha gas engine that came in 0.090 in. oversize. As Arrow Head chrome nickel sleeves have 0.125-in. walls, vertical boring bar was set to bore cylinders to 6 1/4-in. diameter.



EMERY WHEEL on small Thor electric drill grinds clutch part from winch used on wrecking truck.



PREPARATORY TO WELDING in place, C-clamps fasten base plate of G-E 25-hp. induction motor on motor stand of drive frame for bucket elevator. Motor is handled by Cleveland 10-ton overhead bridge crane.

agement is spared the delays of ordering machine tools from manufacturers swamped with high-priority business.

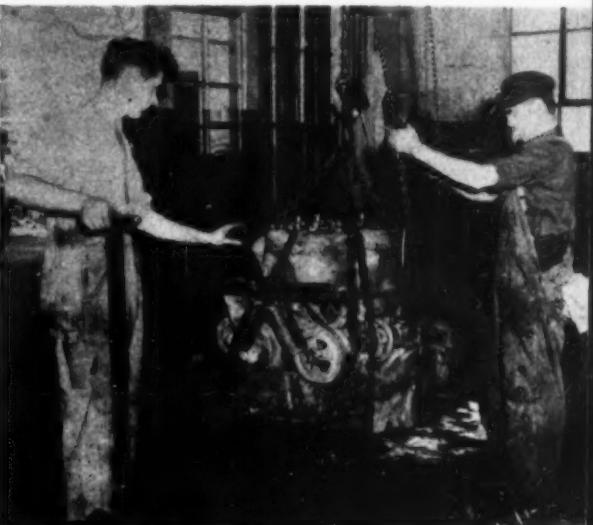
Rebuilding and reconditioning activities are not confined to equipment sent in (with proper priority orders) by war contractors and Army Engineers. Since the beginning of its equipment buying and rebuilding operations, L. B. Smith has been one of the largest renters of machines to contractors. As every renter knows from sad experience, rental machines frequently are abused by the lessee's operators. Ordinary hard usage, too, leaves its mark on the equipment on any job. When Smith's machines come back to Camp Hill, they are taken down, inspected and restored to first-rate working condition before going out to the next job.

Even today, a major part of the shop activities are given to rebuilding machines for the company's own account, although War Department jobs are taking a steadily increasing share of the shop work. The construction equipment department still has out on rental on priority jobs about 250 construction machines, prob-

(Continued on page 86)



TRUCK SHOP and engine shop turn out large volume of work under **CHARLES H. EDWARDS**, superintendent.



FOR UNLOADING Waukesha gasoline engine of Buffalo-Springfield roller from dolly to floor of engine shop, mechanics make use of Peerless 3,000-lb.-capacity chain hoist.

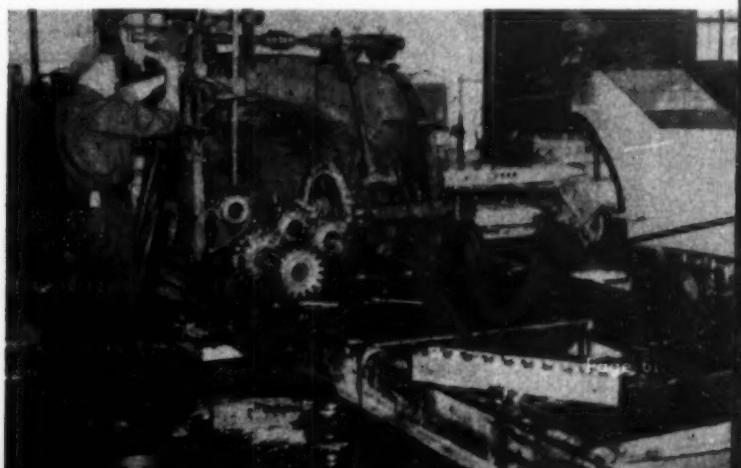
TO REMOVE STUD (below) from Hercules diesel engine, workman first tightens lock nuts with pair of Crescent wrenches, 15-in. and 18-in.

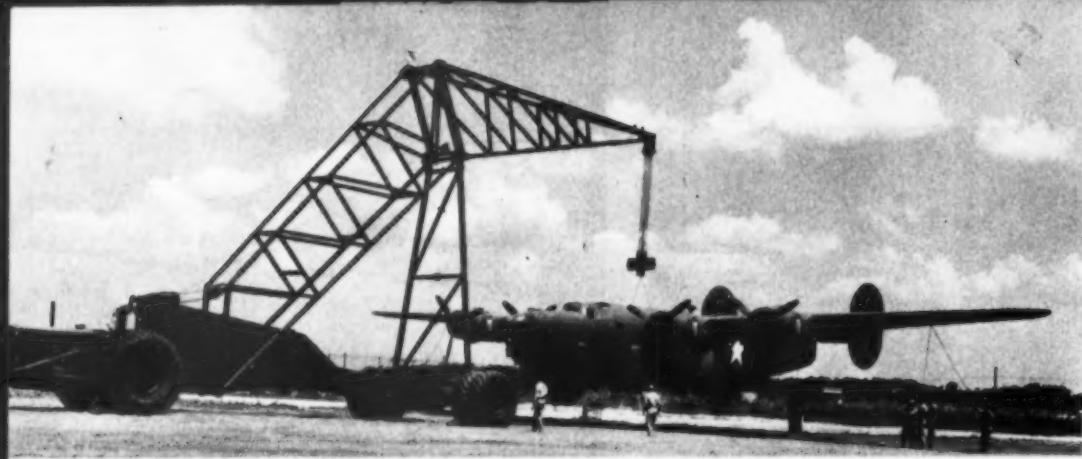


FOR BORING CYLINDER (below) of Hercules OOC gasoline engine with Van Norman vertical boring bar, E. D. GNAU, engine shop foreman, adjusts catpaws inside cylinder to center boring bar and guide it.



COMPLETELY DISASSEMBLED (below) for rebuilding, Buffalo-Springfield roller is thoroughly overhauled in contractors' equipment shop. Snap-On wrench set in foreground aids mechanics in dismantling and reassembling machine.

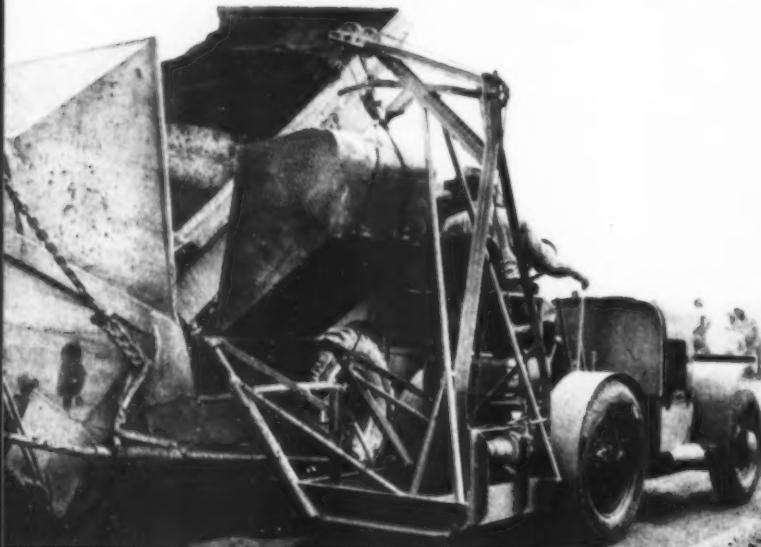




HOW Superind ia

CONSTRUCTION DETAILS

For
Superintendents and Foremen



CEMENT IS SPEEDILY SUPPLIED to mixer on construction of access road to large airplane plant in Washington by means of small motorized vehicle made by contractor. Hopper of "jeep" is filled at stockpiles along road; then vehicle is backed alongside mixer, small hopper is hoisted and dumped into skip of mixer. Two machines on job cost about \$1,200 each.

PORTABLE PUMP on subgrade (below) feeds mixing water through long hose from tank truck at left to paver on Detroit Industrial Expressway contract of Julius Porath & Son Co. for Michigan State Highway Department.



GIGANTIC MOBILE CRANE, just developed by Army Air Forces and equipped with tires higher than average man, shows its prowess by lifting huge 4-motored bomber off ground.



PRECAST CONCRETE GRATING UNITS, 30 in. long, 5 in. wide, and 8 in. deep, for covering drainage trench at edge of paved airport runway, are ready for loading on trucks after 14-day curing period. Units are kept covered with canvas during first 4 days of curing.



ROLLER COATER, as substitute for bristle brushes now difficult to obtain, is recommended by New Jersey Zinc Co. for application of new interior resin-oil emulsion paint, here being used to cover old plaster wall and wallpaper. Rollers are made of heavy carpeting cloth and should be washed immediately after use.

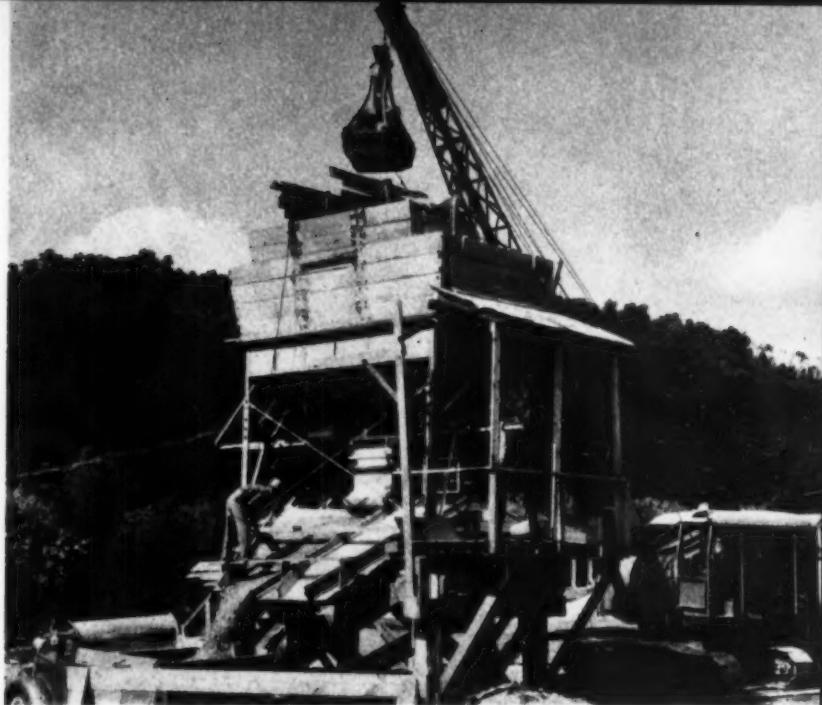


SPLIT PIPE over top edge of shovel saves workmen's boots by protecting soles from wear each time shovel is pushed into ground
—Photo from ANDREW VENA, New York.



MOBILE EARTH MOVER. consisting of tractor-mounted digging bucket that is swung through vertical arc to discharge contents, loads truck in borrow pit near construction area for access road to Willow Run bomber plant in Michigan.

Photo, Michigan Highway Dept.



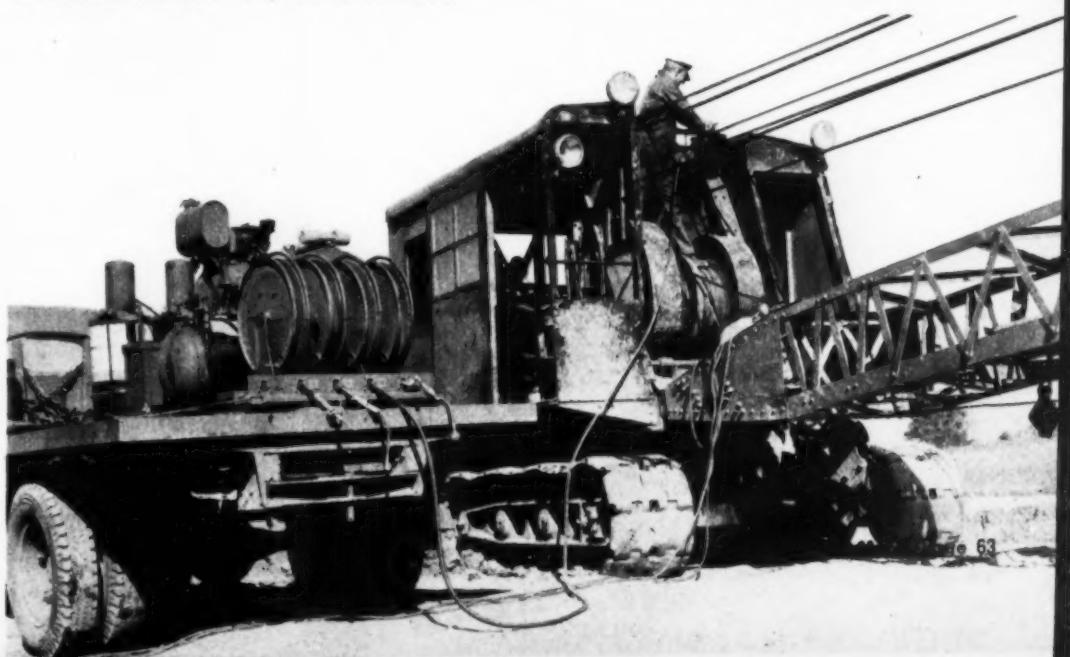
TROLLEY WEIGH HOPPER moved along steel track of Winslow batch plant measures out sand and two sizes of stone for batches truck-hauled to 27E paving mixer on bridge job of D. D. Mullett, Pittsburgh, Pa. With bins charged by General $\frac{3}{4}$ -yd. crane, this plant puts out as much as 32 yd. an hour.



TAPERED CIRCULAR LEGS of tall piers are concreted inside 13/16-in. plywood forms supported by 2x6-in. studs and 3x3x1/2-in. steel angle rings on bridge job of D. D. Mullett, Pittsburgh, for Hinman Bros. Construction Co., holder of road relocation contract from Pennsylvania Department of Highways. Long bolts connect ends of two-part rings through tie-wall between circular legs. Forms are ready for pouring first 20-ft. lift on footing of pier 140 ft. high, one of eight such piers on job. Circular legs, which have base diameter of about 13 1/2 ft., reduce by batter of $\frac{3}{8}$ in. per ft. to 5-ft. diameter at top of pier.



RAILS ARE QUICKLY RECLAIMED from pavements by means of steel roller exerting pressure from beneath. As designed by Fred W. Stiefel, formerly chief engineer of Samuel R. Rosoff, Ltd., device consists of an A-frame mounted on skids made from halves of an I-beam and spaced wide enough for rail to be pulled up between them. Frame supports block and fall used to raise rail ends initially. Then, as frame is pulled along by slowly moving truck, heavy steel roller operating between skids forces rail from ground, while longitudinal pressure of skids keeps disturbance of surrounding pavement to minimum. According to inventor, rails can be salvaged by this method at rate of nearly half mile an hour.



FIELD LUBRICATION (right) of dragline on Twin City access road project is done by truck-mounted Graco air-powered equipment for application of grease and oil from original drum containers. Four hose reels with locking brake provide one 50-ft. air hose line and three 30-ft. high-pressure interchangeable lubricant hoses—one for chassis, one for gears and one for track or hypoid. Lubricating unit is powered by 12-cu. ft. two-stage air-cooled air compressor operating at 175 lb. per sq. in. working pressure and 30-gal. air storage tank. Compressor is driven by 4 1/2-hp. single-cylinder air-cooled gasoline engine.

A New, Faster,

WARTIME SERVICE FROM YOUR ALLIS-CHALMERS DEALER

1 PARTS ASSISTANCE — Information on availability of parts and how to obtain them.

2 PRIORITY ASSISTANCE — Who can get new equipment and how! Up-to-date information and latest regulations.

3 LIMITATION ORDERS — Interpretation of latest government limitation orders affecting construction equipment.

4 INFORMATION — Possess information on subcontract opportunities.

5 REBUILDING FACILITIES — Facilities to handle rebuilding with speed and efficiency.

6 SERVICE EDUCATION — Instructions on how to operate and service equipment correctly. Provides service school instructors.

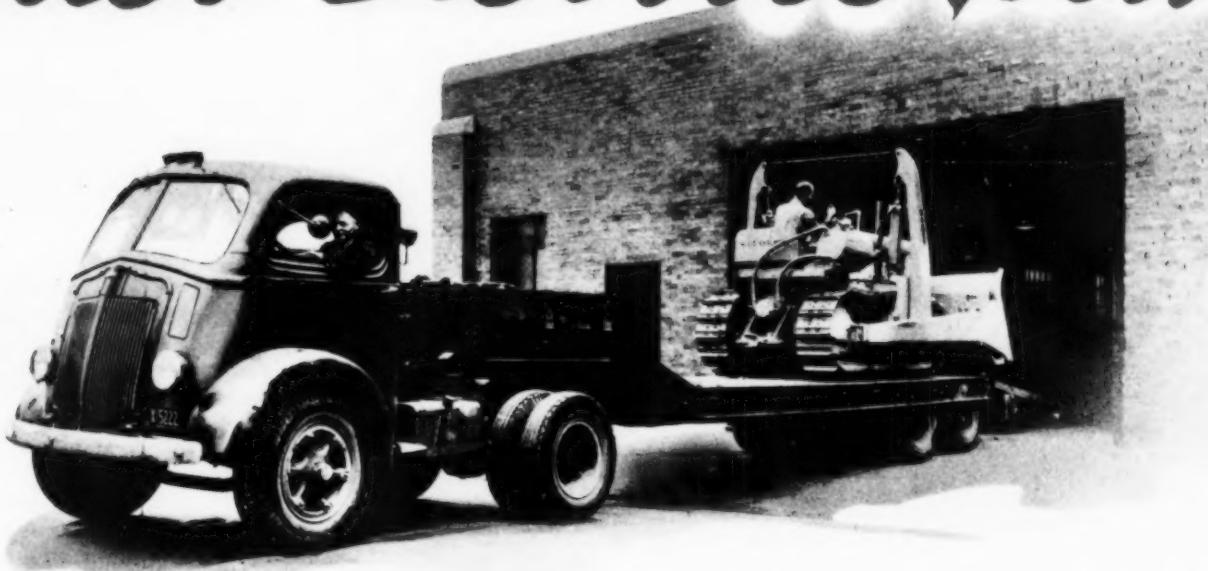
7 USED EQUIPMENT — Good equipment may be available.

8 RENTALS — Good used equipment may be available for temporary emergencies.

9 EQUIPMENT EXCHANGE — Information center on used equipment available in territory.



Better Service Plan



EQUIPMENT OWNERS FIND IT PAYS TO HAUL 'EM IN FOR REPAIRS

Here is a new service plan—of far more benefit to equipment owners. Instead of having dealer mechanics travel to the job to make repairs . . . it's proved to be much better, faster, more economical to haul your outfits to the dealer's shop. Working in comfort, with warm fingers, proper illumination and the right tools, dealer mechanics find they are able to do more justice to a job, and do it quicker. They have the supervision and expert help of the shop foreman — every problem is quickly solved. Parts go farther—worn out or broken sections are fixed up where possible...easily, quickly replaced where necessary. Special tools are available to

speed the job — clean surroundings assure proper handling of delicate Diesel parts. In addition, the owner's operators who bring in the machines, work with the mechanics . . . thereby help cut the cost of the work and learn plenty about the care and maintenance of the outfits.

The cost of transporting the machines is surprisingly small . . . and usually they are back on the job sooner . . . ready to work longer. Find out for yourself how well you will like this shop plan. Next time your units need repairing . . . haul 'em into your Allis-Chalmers dealer. He's equipped to do your work right, fast and at bigger savings!

HOW THE SHOP PLAN IS WORKING OUT IN ONE TERRITORY!

"It is surprising how much better the customer has been satisfied and how little it costs to transport the tractor to and from our shop. We are turning out more tractors . . . do a better job . . . get better acquainted with the owners and operators," says Walling Tractor & Equipment Company, Allis-Chalmers dealer at Portland, Ore.



ALLIS-CHALMERS

TRACTOR DIVISION • MILWAUKEE, U. S. A.

Airport Paving

BY ROAD-MIX METHODS SAVES SIX MILLION TON-MILE HAUL



A SAVING OF GASOLINE AND RUBBER that otherwise would have been used in making a 12-mi. haul with 480,000 tons of material was effected in a recently completed contract by substituting a base stabilized with oil emulsion for the standard gravel base in the paving of 1,000,000 sq. yd. of airport runway surfaces. This saving was suggested by the government engineers and was effected by adoption of the contractor's alternate bid in



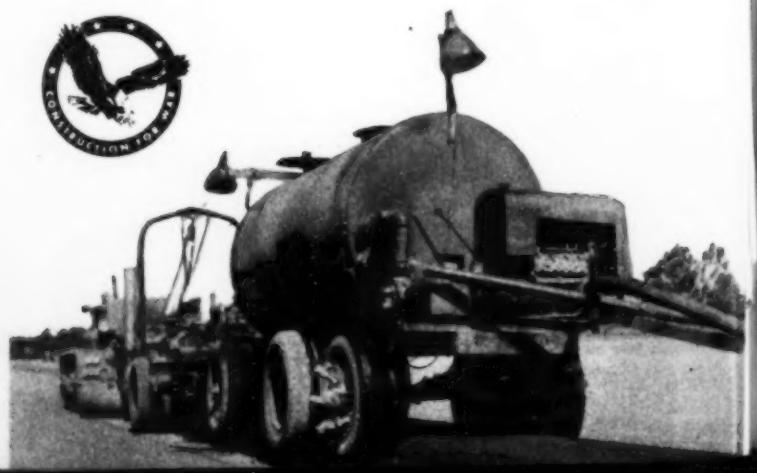
MATERIAL IS BEING FED from window into road-mixer where oil (RC-3) is mixed in by rotating paddles.



CLYDE W. WOOD (left) contractor, and his son, FRANK C., assistant general superintendent on this project, look over blueprint in front of road-mixer controls.



THOROUGHLY OILED MATERIAL (below) is left in windrow behind road-mixer.





ROAD-MIXER TRAIN is picking up materials from surface (no windrow here being used). Reserve oil supply truck is at left, and additional water supply truck is coming up from rear.

which materials lying on the surface at the site would be utilized by road-mix methods. This plan made it unnecessary to import materials that would have been required had the ordinary "hot-mix" asphalt methods been used.

The job originally involved 650,000 sq. yd. of 8-in. base and 350,000 sq. yd. of 6-in. gravel base, both topped with a surfacing of 2-in. plant-mix of gravel and Grade D asphalt. For this was substituted 650,000 sq. yd. of 6-in. and 350,000 sq. yd. of 4-in. soil stabilized base using the standard mixing emulsion for the bases and topping both bases with a 2-in. surfacing composed of gravel mixed-in-place with an RC-3 cutback asphalt. The work was started early in June

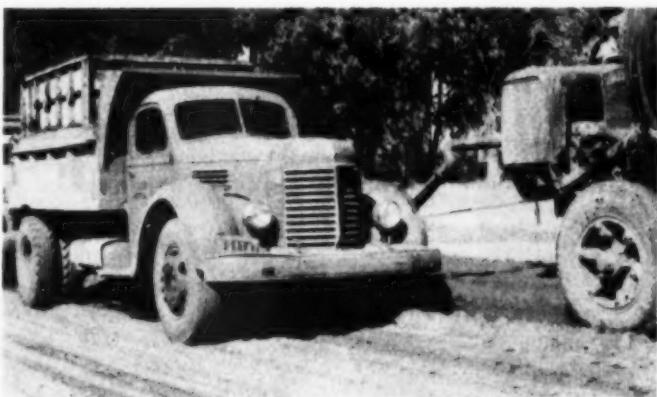
(Continued on page 96)



ACCURATELY MEASURED MATERIAL on main airport runways is put up in windows ahead of mixer by spreader-box having fixed orifice.



WINDROW (right) is left behind road-mixer that collects its own material without benefit of previous windrowing.



RESERVE WATER SUPPLY is kept close at hand by using tow cable to hook tank truck to rear end of train and then shutting down truck motor.



WAITING TO BE SPREAD by blader is windrow into which RC-3 has been mixed.



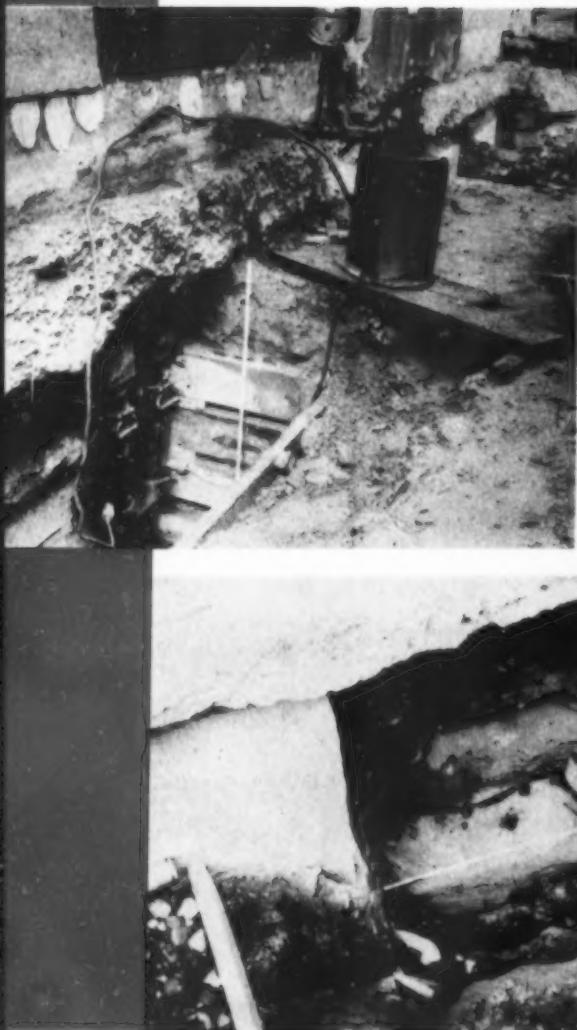
WHEELS OF PNEUMATIC ROLLERS (below) are so arranged that entire width of strip traversed gets compaction.



MATERIAL FOR TOP COAT (below) is waiting for tack coat to be applied.

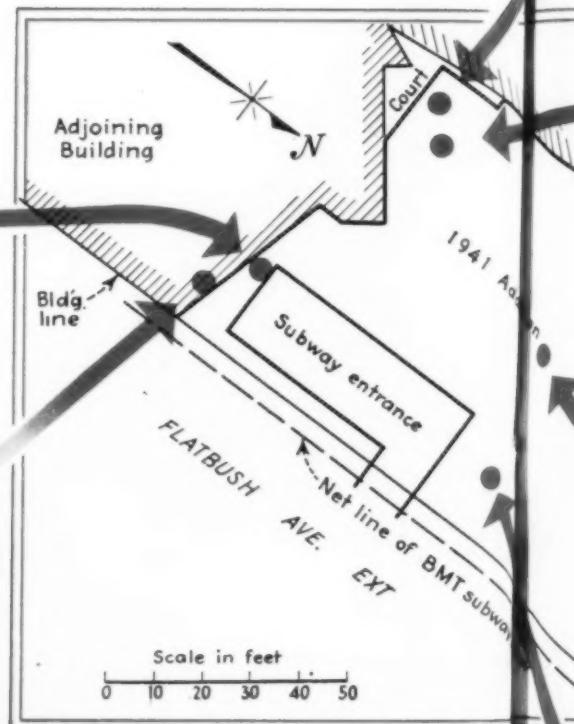
In Close Quarters

Pile Foundation for Building Addition Is Installed Alongside Subway and Other Structures



PRETEST PILING (left) of steel cylinders, later filled with concrete, was jacked down hydraulically in sections beneath cellar wall of existing building along south property line, as it was considered unsafe to drive ordinary piling in this area due to condition of adjoining building. Each pile was tested to 45 tons, amounting to 50 percent more than the designed load.

BOULDERS ENCOUNTERED (below) in installation of Pretest piling had to be broken up and removed. Concrete at either side of pit incases Pretest piling already in place.



PLAN OF SITE for addition to existing Dime Savings Bank Buildings shows relation to B.M.T. subway and adjoining structures.

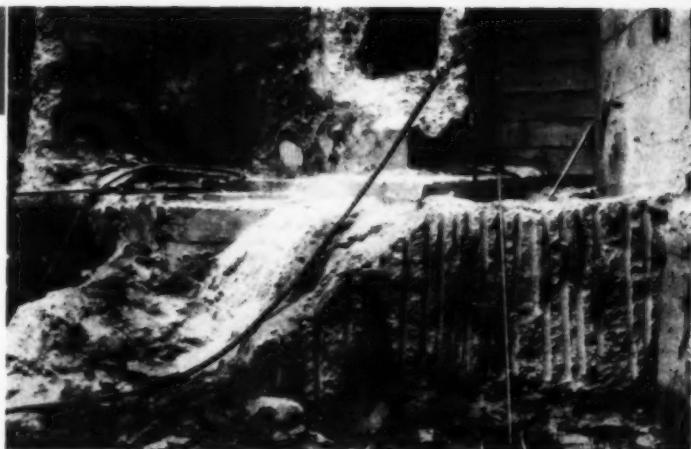
ADEQUATE SUPPORT alongside the adjacent B.M.T. subway on Flatbush Ave. Extension constituted the chief problem for the contractors, Spencer, White & Prentis, Inc., in providing a foundation for a recently completed addition to the existing building of the Dime Savings Bank in Brooklyn, N. Y. Excavation for the subway had been carried to a depth of 35 ft. below the street, and the Board of Transportation was unwilling to per-

mit the imposing of substantial loads on the soil close to the subway structure. To meet this requirement, concrete-filled steel tubes were used as the most economical method of transmitting the column loadings of the new building addition adjoining the subway to a proper bearing below the subway subgrade. As indicated in the accompanying plan, the building addition had to be fitted into an irregularly shaped plot measuring about

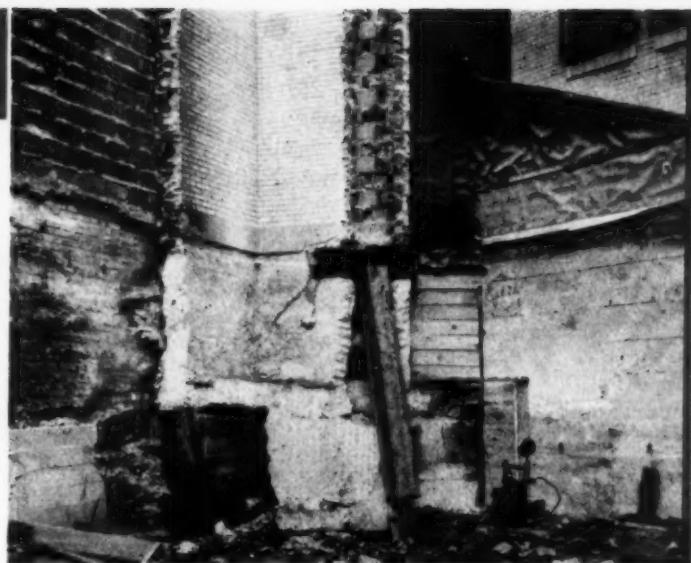
125 ft. on Flatbush Ave. and 80 ft. in depth.

Soil tests made when the original bank building was constructed in 1931 disclosed the fact that coarse sand and gravel extended to a depth of 30 ft. below the street, and beyond that point the material was fine water-bearing sand with reduced carrying capacity. As had been anticipated from test borings, the piles put down for the subcellar beneath the greater part of the original building drove easily, and required penetrations of about 30 ft. to obtain proper bearing. At a higher level, where only a single cellar instead of a subcellar was included in the design for the main building, the average penetration of

(Continued on page 84)



HEAVY CONCRETE MASONRY in southwest corner of site had to be removed carefully by drilling and plug and feather methods to permit driving of piles for substructure of building addition.



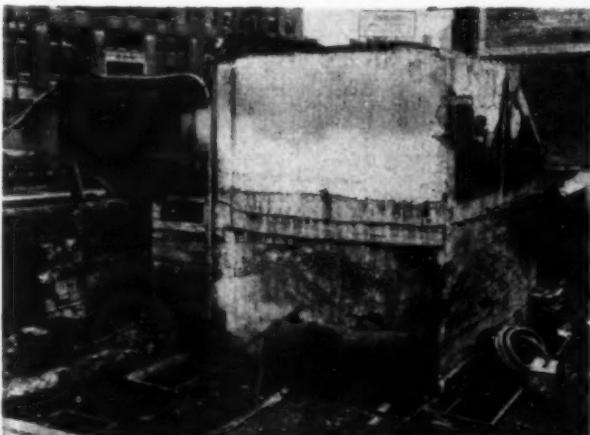
SHORING was necessary to support walls of adjoining structure which had undergone considerable settlement. Hydraulic jack-puts inclined timber strut into compression against horizontal I-beam bearing member under wall.



EXCAVATION for elevator pits had to be carried 12 ft. below cellar grade alongside original bank building at northwest corner of plot. Worker in foreground is removing sheeting used in original excavation.



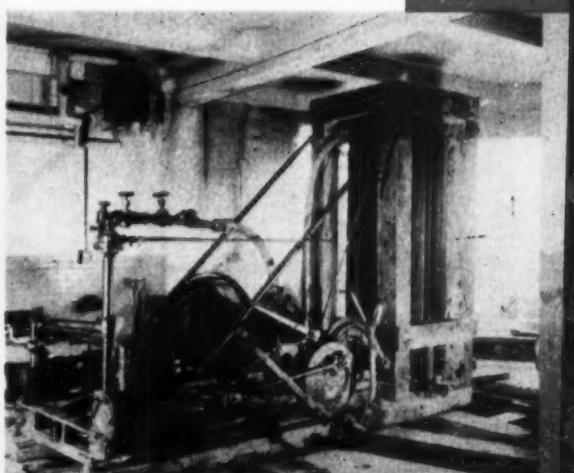
OLD CONCRETE PIERS (right) built to underpin adjacent structure in connection with construction of main bank building in 1931 had to be removed to provide for new foundation



SUBWAY ENTRANCE STRUCTURE of concrete along side of bank building addition on Flatbush Ave. had to be maintained in service during construction, requiring underpinning of walls.



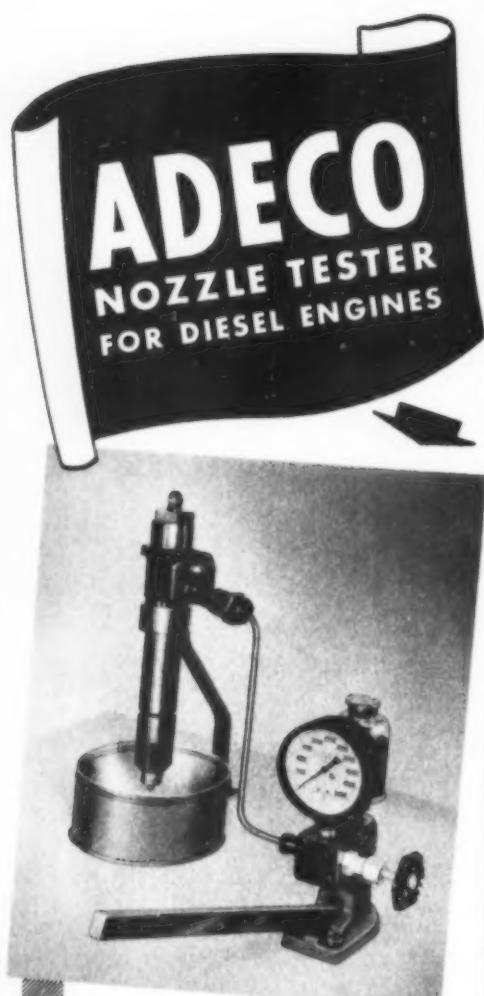
DRIVING OF PILES of 10 $\frac{3}{4}$ -in. o.d. steel cylinders fitted with cast steel points is done with steam hammer working in leads hung from boom of crawler crane.



DWARF PILE HAMMER RIG for work in low headroom was devised for use inside existing garage where piles for new column footings were put down in short sections joined by steel couplings.

CONSTRUCTION EQUIPMENT NEWS

*Review of Construction Machinery and Materials
for FEBRUARY, 1943*



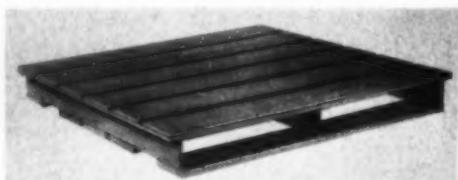
VITAL FOR MAINTENANCE

PORtABLE . . . EASY TO USE . . . KEEPS DIESELS AT PEAK PERFORMANCE

With this advanced-type, portable diesel nozzle tester, any mechanic can make quick, accurate tests of injector opening pressure, spray pattern, stuck needle valves and leakage around valve seats. Compact, light in weight and precision-built, the Adeco Tester checks all makes and sizes of injectors—on bench or engine—at pressures up to 10,000 p.s.i. Avoids costly delays and possible damage to injector tips. Keeps diesels operating at peak efficiency.

Write for new illustrated "Know-How" bulletin describing this Adeco unit—America's most widely used nozzle tester.

AIRCRAFT & DIESEL EQUIPMENT CORPORATION
4401 NORTH RAVENSWOOD AVE.
CHICAGO, ILLINOIS



NEW TYPE PALLET, specifically designed to conserve steel, consists of top and bottom wood slats reinforced with steel at ends and in center. Bolted construction permits easy replacement of wood slats while steel ends protect pallet from damage by power fork trucks. Available in sizes to meet ordinary materials handling requirements.—The Union Metal Manufacturing Co., Canton, Ohio.

★ ★ ★

TAILORED PROTECTIVE CLOTHING for women welders, styled according to accepted dressmaker patterns, is made of specially selected chrome tanned cowhide, said to be light in

and ears during welding operations. Tailored cap has been designed made of chrome tanned leather and shaped like a bathing cap, with flaps extending over ears. Overalls are styled like women's slacks with side placket and flared trouser legs to make garment easy to put on over safety shoes.—American Optical Co., Southbridge, Mass.

★ ★ ★

COATING FOR CONCRETE AND WOOD STORAGE TANKS called "Carbo Petro—Non-Solv," is said to prevent infiltration of gasoline and oil into contents of these containers and to be absolutely inert to petroleum, coal tar and manufactured solvents, organic and inorganic oils and fatty acids. Will dry hard within 2 or 3 hr. Two or three applications are recommended, depending upon porosity of surface to which it is applied. Two coats are usually sufficient on steel or wood. Three may be necessary on concrete surfaces. First coat will cover approximately 150 sq. ft. per gal.; on subsequent coats a gallon will cover 200 sq. ft. Available in red, white, green or blue.—Carbozite Corporation, First National Bank Bldg., Pittsburgh, Pa.

★ ★ ★



weight and to give positive protection against dangerous flying sparks. Cut to afford free and easy movement of body, and yet, fits snugly enough to prevent sparks from entering. Complete line consists of tailored cap, short jacket, coat, overalls, sleeves and 36-in tailored apron. Seams of protective clothing are located away from direct line of fire. Welted inseam construction is used throughout for extra strength and to protect stitching from hot sparks. To protect hair

"ARMORED TEXTURE", designed to enhance appearance and increase weather resistance of medium-priced "Tite-On" asphalt shingles, accentuates wood grain appearance of shingle by making grain lines more pronounced. Grain lines instead of being black are "armored" with colored mineral granules selected to provide pleasing color contrast with body of shingle. Rüberoid



"Tite-On" shingle derives its name from fact that each shingle, in addition to being nailed to roof deck, is also secured by locking at four points with adjacent shingles. This interlocking feature is an integral part of special shingle design, no wires, no clips or metal ends being required. Result, it is claimed, is shingles which cannot slip apart or blow up or off.—The Rüberoid Co., 500 Fifth Ave., New York City.

Navy Takes Over Diesel School

Buildings Once Used by Military Academy Now House Sailors

Ready for an intensive course that might well be entitled the "care and feeding of Diesel engines," 150 enlisted men of the United States Navy arrived here yesterday and "took over" the buildings formerly occupied by the Harvard Military Academy at 1600 S. Western Ave. Training of the men will be handled by the Hemphill Institute.

They'll Fight the Diesel Way

Experts Who Will Maintain The Powerful Engines That Will Drive Army's Big Tanks And Other Machines Are Being Trained At School Now Under Way In Memphis

THOSE nearly 400 soldiers who four times each day march smartly up or down Adams Avenue are not here just to be taught the rudiments of infantry drill.

For instance, that young man with the curly hair you have noticed in the first company may be driving a Diesel truck in Egypt or Australia, operating a

Ralph Hemphill, the founder of the Hemphill schools for several years had two Auburn cars equipped with Diesel engines and these cars continually toured the country with fuel costs that were so low that they seemed almost unbelievable.

The Diesel for years has been making steady progress as a power unit for tractors and stationary engines such as are used on farms. Thousands of heavy trucks also are Diesel.

There are many large buildings in the west which are

Diesel School "Enlists" For the Duration

There is no pomp and circumstance at the Hemphill Diesel School where Coast Guard men are being trained in the operation and maintenance of marine Diesel and gasoline engines in an intensive course employing the Hemphill system that proved so successful in training civilians for Diesel work. Since the general system is being used, the young men are not only being equipped for engine work in the service but are also being given a course of training that will help them find good employment in Diesel plants when the war is won and they return to civilian life.

Class in New York during the Coast Guard training period reveals a surprising change, and a revolution—over the work that was done while the students were being trained. The equipment has been improved, more of the latest type Diesel are used, and the course is better. The school is putting forth its best efforts to give the Coast Guardsmen the sort of training they will need and the types of engines they are most likely to encounter.

The class is made up of 200 men, the majority of whom are taking courses at their own request. Some are enlisted men assigned to the Diesel training course by the U. S. Coast Guard. They are given quarters in a hotel in New York City and obtain their meals at a cafeteria in the school.

A total of 200 hours of intensive training in the school is given. Lecture lectures on theory of engine will be given. The other half is spent on shop work on the engines and on instruction in maintenance and repair.

The student is given some shop work to be completed outside of regular school time. The group is an interactive group, which attends the lectures one day and

then practical training the next.

Intensive training is given on the essentials of operation. Every type and most of the makes of fuel injection systems are studied in a separate class, where students are required to disassemble fuel pumps, fuel injectors and combustion chambers. The fuel pumps and injectors are taken apart, put back together, adjusted, tested and operated to make them over and over until they understand

HEMPHILL SCHOOLS, Inc.

3128 QUEENS BOULEVARD, LONG ISLAND CITY, NEW YORK

It is gratifying, after many years of successfully training civilian Diesel operators, to be chosen by the Government to assist in the important task that lies ahead.

Ralph Hemphill Chairman of the Board and Founder

Hemphill Diesel Schools also located at

LOS ANGELES:
1601 So. Western Ave.

CHICAGO:
515 So. Western Ave.

MEMPHIS
421 Monroe Ave.

AMERICA'S ORIGINAL EXCLUSIVE DIESEL TRAINING INSTITUTION

MOVE MORE SCRAP... ...faster...easier...cheaper

America needs scrap iron and steel . . . millions of tons of it . . . the war can't be won without it. Every mill, factory, shop, mine and other organization of American industry must contribute every available pound of scrap metal to the nation's war effort. Make your clean-up complete . . . in your home and at your plant. Do your share to get all the needed scrap into the fight.

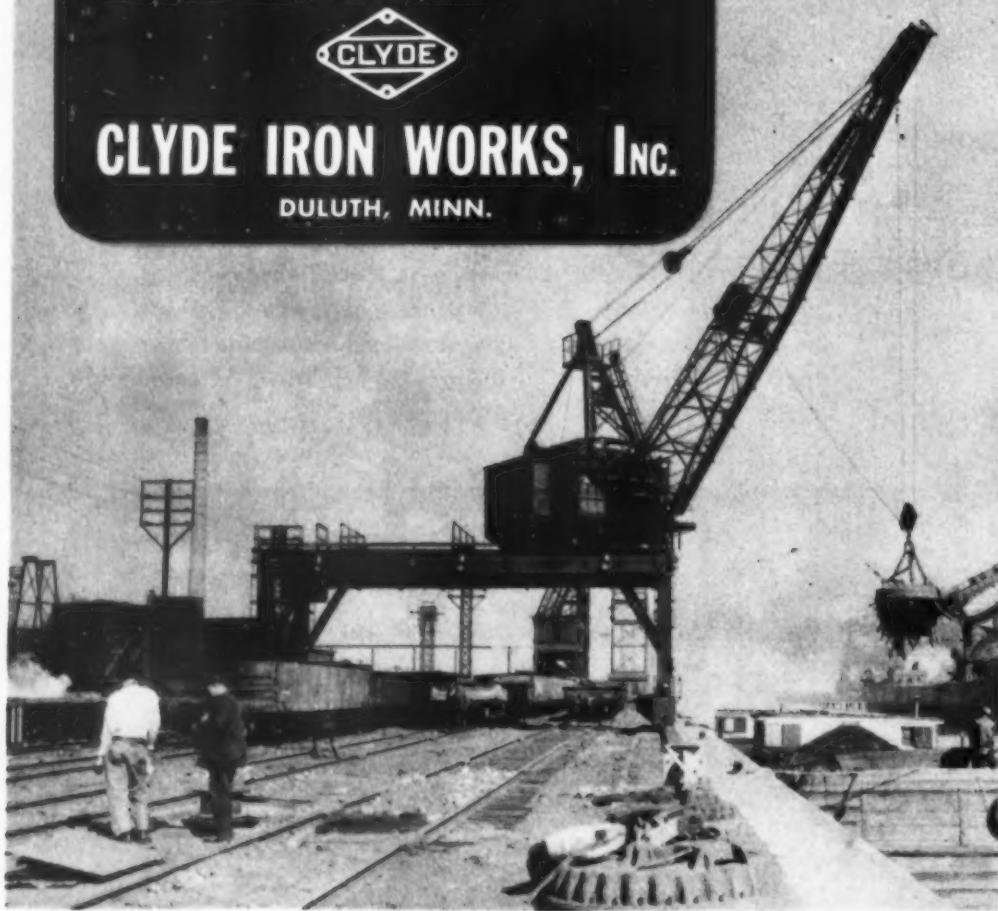
Clyde Whirleys have proven to be ideal machines for moving scrap. In the same way they handle coal, sand, gravel or any other kind of material at industrial plants, loading stations or on construction jobs . . . efficiently and economically.

The long reaching booms of Clyde Whirleys, cover an exceptionally large area . . . their balanced design results in smooth and fast swinging with no strain on the center pin. Clyde's equalized wheel arrangement on the turntable insures against individual wheel overloading as the load on each wheel can be definitely determined.

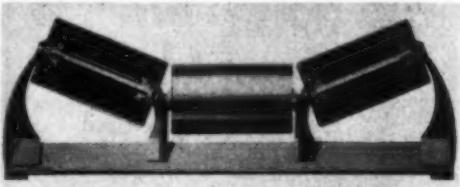
Seven standard sizes to choose from with lifting capacities from 22,000 lbs. at 150 ft. to 140,000 lbs. at 35 ft. boom radius.



CLYDE IRON WORKS, INC.
DULUTH, MINN.



STREAMLINED BELT CONVEYOR IDLERS of sizes and types suitable for every belt conveyor application have rolls of 4-, 5-, and 6-in. diameters of either cast-iron or steel that are equipped with anti-friction bearings. They are easily removed from supporting brackets by lifting out. All metal, labyrinth-type grease seals have five passes with inner members protected from damage by mal-



leable iron nut. Seals are said to keep dirt and water from getting into bearings. Malleable nut serves three purposes: (1) Right- and left-hand threads make possible minute adjustment of bearings; (2) sloping surfaces shed conveyed material, preventing entrance to bearings; (3) recessed groove in nut fits over sloping brackets tying them together and supporting rolls. Certified malleable iron brackets, of inverted "V" shape to shed dirt and amply ribbed for strength, are jig welded to inverted angle base or to channel base, as desired—Continental Gin Co., Birmingham, Ala.

★ ★ ★

NEW E-C CORD MULTI-V. BELT is sheathed with a new, tougher, black cover that insures longer wear, more uniform pull and higher resistance to heat, oil and other enemies of long belt life. More uniform pull and better balanced performance are said to result from the fact that it is possible to build this new black cover with more consistent coefficient of friction, essential to a balanced drive. In addition, Goodyear "compass" cord construction is claimed to concentrate the load-carrying cords in the neutral axis where all pull evenly, without uneven stresses, thus enabling the belt to deliver higher efficiency on multi-V drives. Made in all standard cross-sections and lengths and is sold in sets, precision-matched under operating tensions—Goodyear Tire and Rubber Co., Akron, Ohio.

★ ★ ★

CORRUGATED ASPHALT SIDING made of rags and resin is new war emergency building material offered for use in government and private construction as substitute for corrugated steel sheets. May be used for covering outside walls of temporary structures of all kinds, including factory buildings, warehouses, storage and machine sheds. Consists of two sheets of heavy felt saturated with recently developed resin-bitu-



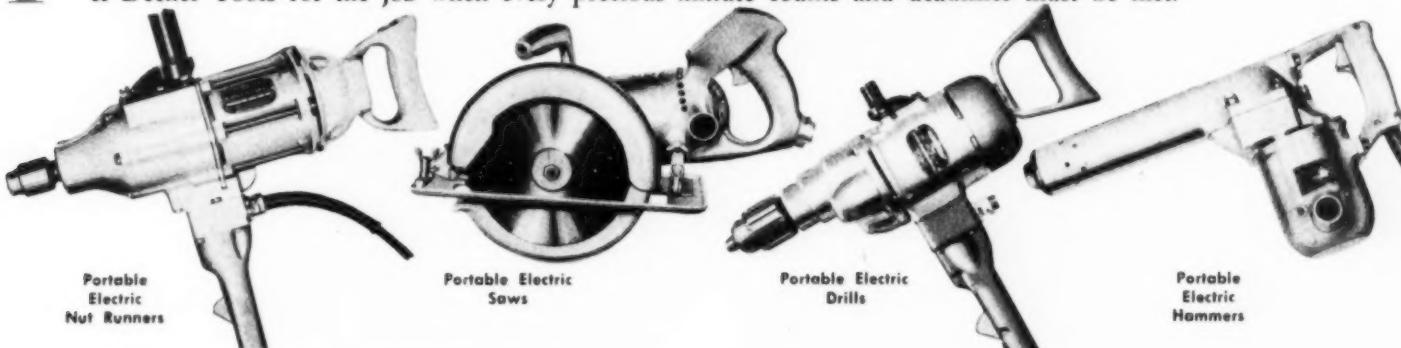
minus compound and bound together with high melting-point asphalt adhesive and corrugated under high pressure. Finished sheets are hard, rigid, light in weight and moisture-proof. Retain stiffness and corrugations in summer weather because of high-melting-point, wear-resistant resins used in saturating process. Weighs approximately 12 oz. per sq. ft. and is available in five sizes: 28 in. by 6, 7, 8, 9 and 10 ft. Applied in same way as corrugated steel sheets. Life of siding may be prolonged indefinitely by coating or painting immediately after using and every few years thereafter.—The Celotex Corp., 120 S. LaSalle St., Chicago, Ill.

5 SUGGESTIONS

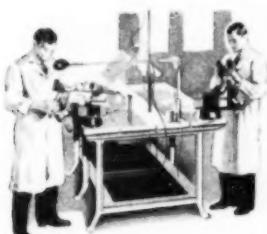
that can Help You Keep War Construction "Ahead of Schedule"

1 Do Jobs Faster, Better — Use Portable Electric Tools Whenever Possible

These Black & Decker Electric Tools are helping speed big scale construction jobs all over the country — from army cantonments and naval bases to war plants and housing projects. Contractors specify Black & Decker Tools for the job when every precious minute counts and deadlines must be met.



2 Know Your Facilities for Expert Repair Service



There's a Black & Decker Factory Branch near you (26 of them from coast to coast), always ready to give you quick, expert service if you need repairs. Factory-trained mechanics, working with genuine B & D parts, are your insurance against costly breakdowns that might tie up important war jobs.

3 Depend on Your Nearby Distributor as a "Source of Supply"

Whether you want tools or tool information, your nearby Black & Decker Jobber is the man to see. He's dependable, convenient, always ready to help



you with any tooling problems you may have. This "source of supply" service and largest field force in the electric tool industry can help you get full use of your electric tools . . . save vital hours on hurry-up war jobs.

4 Keep Your Tools Going on the Job — Here's the "Know How"

Keep your equipment in good shape, keep your tools on the job. Check over tools regularly, see that they are well lubricated, oiled, cleaned — make 'em last. Send for these FREE handbooks on the "Care and Use of Electric Tools." They're helpful and informative—especially for new men on the job. Write: The Black & Decker Mfg. Co., 759 Penna. Ave., Towson, Md.



- General Tool Catalog
- Saw Handbook
- Hammer Handbook
- "Proper Use and Care" Drill Handbook

5 Get in the Fight Yourself — Turn in Your Scrap



Uncle Sam needs every ounce of scrap metal, broken tools, obsolete machinery. Such junk lying around your tool sheds and construction projects only hampers your building schedule. Reclaim it—get it working for America . . . and help lick the Axis.

LEADING DISTRIBUTORS EVERYWHERE SELL

Black & Decker
PORTABLE ELECTRIC TOOLS

**SPECIALS WASTE TIME
...TRY LAUGHLIN'S
STANDARD LINE
EYE BOLTS
FOR ALL JOBS**



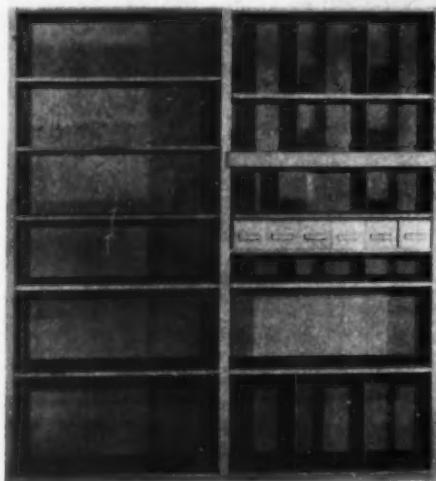
Keep your eye on this picture if you're thinking of having special bolts made up. Every minute counts! Laughlin standard eye bolts will likely fill the bill. All weldless — all drop forged steel. Nut type with extra length threads for extra adjustment. Send for latest Laughlin Catalog showing standard stock eye bolt sizes in nut, screw and rivet types.

*Distributed through
mill supply houses*

Look for Laughlin Products in Thomas' Register



ADJUSTABLE SHELVING formerly made of steel is being offered in wood for the duration in open and closed types. Sections are 36 in. wide and 84 and 96 in. high and may be had in 12-, 18- or 24-in. depths. Top, base, shelves, braces, arms



and uprights are made of solid hard wood. Side and back panels on closed type are $\frac{1}{4}$ -in. plywood. Finished with green tinted preservative coating that reduces moisture absorption. Easy to set up. Features include dividers, bin fronts, adjustable shelves and shelf boxes.—Lyon Metal Products, Inc., 3181 Clark St., Aurora, Ill.

★ ★ ★

FORGE WELDER, named "Temp-A-Trol," makes possible spot welding and heat-treating of alloy steels and heavy sections and permits employment of relatively unskilled labor for spot-welding operations. Without changing machine controls, welds of exactly equal quality can be produced consecutively in $\frac{1}{4}$ to $\frac{1}{4}$ in., in $\frac{3}{16}$ to $\frac{1}{4}$ in., in $\frac{1}{4}$ to $\frac{3}{8}$ in., or in three sections of $\frac{1}{4}$ -in. material at same time. In addition, welder can be used to heat-treat weld automatically in same operation, refining grain size of weld, increasing its ductility, giving it proper grain struc-



ture and "tempering" weld nugget and adjacent area to desired amount consistent with characteristics of individual alloys. Weld itself automatically controls functioning of machine so that instead of having definite weld time and welding current with variable weld quality, "Temp-A-Trol" reproduces definite weld-quality with automatically self-adjusting current and time cycles. Control panel carries six "temperature" dials, operating in automatic sequence and so arranged that they will produce almost any desired variety of weld and heat-treat cycles up to five individual heats and one common "cool." "Two-stage" foot-switch enables operator to bring electrodes down on work. If work is not lined up properly, releasing foot switch will retract electrodes without starting machine.—Progressive Welder Co., Detroit, Mich.



PORTABLE HYDRAULIC BENDING MACHINE for use on railroads, in shipyards and industrial plants is said to bend without heating and filling and in one single operation all iron and steel pipe as well as solid bars of mild steel from $\frac{3}{8}$ to 2 in. in 3 min., or less. Equipped with forming heads actuated by hydraulic piston operated by pump handle at rear of assembly. Has overall length of 32 in. and weighs 98 lb., with largest forming head. Adaptable to any job with quick changeover to various pipe sizes. Saves critical materials and labor by eliminating numerous elbows and fittings. Claimed to eliminate possibility of leaky joints and to reduce friction losses by producing smooth bends. In addition to pipe and bar bending, Tal's Prestal bender can be used for pressing or pushing operations.—Tal's Prestal Bender, Inc., Milwaukee, Wis.

★ ★ ★

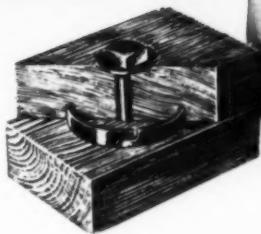
SAFETY CLOTHING for women welders features leather sleeves, aprons, jackets, leather gloves and special women's head and hair covering. Made of high quality material, comfortable and light in weight, they are said to provide full protection for all parts of body. Complete details and specifications are to be found in new bulletin GEA-3295.—General Electric Co., Schenectady, N. Y.



GROWING PLANTS

Selective cutting under scientific woods management has harvested over one tree and left a healthy, vigorous forest. New seedlings for tomorrow's forest will spring up where sunlight can reach down to the forest floor.

The TECO Ring Connector spreads the load on a timber joint over practically the entire cross-section of the wood . . . brings the full structural strength of lumber into play.



Plants for Industry - Today and Tomorrow



Roof Trusses by Timber Structures, Inc., Portland, Ore.
Engineers, Architects, Designers, Builders in every field of industry now are using engineered timber for heavy duty structures. The TECO Timber Connector System made this possible. You, too, can design in timber with TECO. Write for our literature today.

Timber ENGINEERING COMPANY
WASHINGTON, D. C. PORTLAND, OREGON

TWO SHOTS OF A KIND Aimed at the Same Foe!

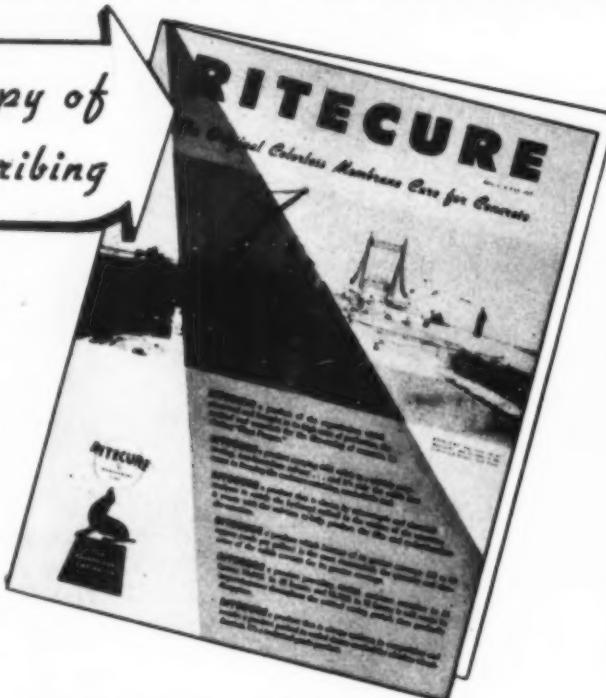


EVERY ENGINEER...EVERY CONTRACTOR...

Should have a copy of
this bulletin describing
**THE INDUSTRY'S
FILM-CURING
COMPOUND
FOR CONCRETE**
*...the Compound
with 60% Solids*

EVERY TEST shows that it's the solids in the film that count most in providing a satisfactory film-cure for freshly laid concrete.

And every fact points to film-curing as the most efficient and most economical way to cure concrete.



R I T E C U R E

A Transparent Membrane for Curing Concrete

IS SOLD BY:

THOMPSON MATERIALS CO.

204 West St., New York, N. Y.

A product of THE JOHNSON-MARCH CORP., 52 Vanderbilt Avenue, New York, N. Y.

CURING MATERIALS CO.

2130 Jane St., Pittsburgh, Pa.

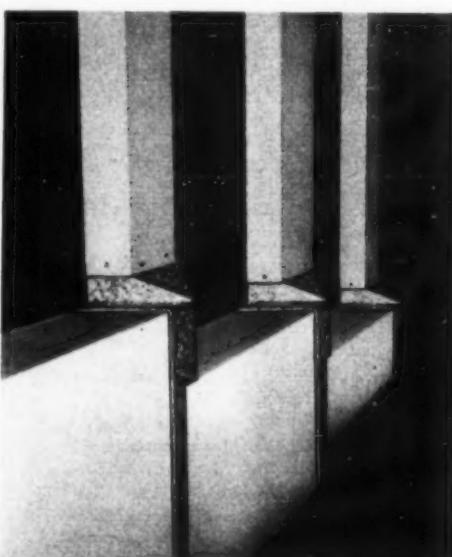
NYLON TAPERED PAINT BRUSH BRISTLES are said not only to have required taper but also resiliency, toughness, length and inertness to paint ingredients and to wear three times longer than natural bristles. These bristles have been developed to take place of pig bristles which formerly came from China and Russia. Shipments



of which are now halted by transportation difficulties. Entire output of these brushes will be used by Government until end of war when they will be available for civilian use. Advantages: (1) Since nylon is made basically from coal, air and water, supply of bristles is inexhaustible; (2) nylon is ready to be placed in brush handle when it reaches manufacturer without usual disinfecting, cleaning, trimming and blending necessary in making hog bristle brush; (3) moth-proof, will not deteriorate in storage, will not dry out or rot. May be cleaned with normal paint cleaner.—E. I. duPont de Nemours & Co., Wilmington, Del.

★ ★ ★

NON-METALLIC SUPPLY DUCT for use in warm air heating and air conditioning systems is acceptable in residential installations carrying normal temperatures in either gravity or blower types and can be used up to within 6 ft. of



plenum chamber. Because of asbestos content of make-up, it is listed under Federal specifications as "fire retardant." Claimed to save 90 percent of usual metal in typical installation and to be quicker to erect. Small amount of metal necessary can usually be found in available scrap.—Sall Mountain Co., 176 W. Adams St., Chicago.

Here's Why HEIL Cable Scrapers Dig Capacity Loads Fast . . . without Voids or Waste



Because of its scientifically designed bowl and correctly pitched cutting blade, the Heil Cable Scoop digs bigger payloads faster . . . But this isn't the "one big feature" of Heil Cable Scrapers. It is merely one of many. Heil engineering also gives you all-welded construction — fulcrum-type lift — scientifically located draft-pivot point — ample tire clearance — an all-around design that assures you of faster, more efficient performance in the toughest situations you ever run into... If you want bigger "bonus loads," easier maintenance and simpler field repairs, longer life, a name for meeting hurry-up schedules — here is the equipment for you . . . Write for bulletins illustrating these Heil features.

R-7



CORRECT BOWL DESIGN

The size and shape of the bowl and front gate make for good boiling action. The back sheet of the bowl proper slopes forward at the top.



. . . CONFORMS WITH NATURAL BOILING ACTION

The dirt has a tendency to boil into a mound-like load. The Heil bowl fits the load — without extra digging time and spillage due to forcing dirt into empty pockets at the rear.

THE HEIL CO.
GENERAL OFFICES • MILWAUKEE, WISCONSIN

MERCER

WHEEL-TRACTOR CRANES

Ask the Men Who Handle 'Em!



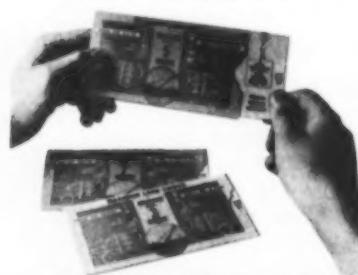
"We're pals — me and my Mercer Crane! Just show us the work...we'll clean it up in jig time. My No. 7's a real sweetheart — it's just about the smoothest tonnage tackler on wheels!"



"Mercer—that's MY Crane! It picks 'em up and puts 'em down just like it was no effort at all! You'll go a long way, Buddy, before you'll find a Mercer Crane that can't take it!"

3, 5 and 7 Ton Capacities!

Compact, fast, sturdy...they deliver hard, continuous service at low cost. Gasoline-powered . . . one-man operation. Single or double-drum hoists. Cushion rubber or pneumatic tires. Special booms and heads for every type of lifting, carrying and loading. Parts standardization means simple adjustment and servicing in the field. Our new Catalog No. 65 completely illustrates and describes the entire line. Write for your copy today.



To assist Mercer Crane Operators and help conserve equipment, we offer a group of "Maximum Load Finders" covering all models. These jumper-pocket size "rules", shown at the left, tell the operator at a glance exactly the maximum load he can safely carry at various distances in front of the bumper plate. These handy gadgets are yours for the asking!

MERCER ENGINEERING WORKS, INC.

Materials Handling Equipment

30 CHURCH STREET, NEW YORK, N. Y.

WORKS: Clifton (Allwood), N. J.



Standard Live Boom equipped with double sleeves for main and topping hoist lines.



A Single Hoisting Line that goes over the top—designed especially for stereotypes.



"THE NAME THAT
CARRIES WEIGHT"

NEWS FROM MANUFACTURERS About Their Products

The publications reviewed below, will keep you posted on latest developments in construction equipment and materials available for your use.

LABOR UNION AGREEMENTS—International Union of Operating Engineers, A.F. of L., 216 High Ave., Cleveland, Ohio. (80 pp., illustrated.) A record of contracts in effect in Ohio during 1942 between employers, trade associations representing employees and Locals of the International Union of Operating Engineers. Constitutes a working manual of wage rates, hours and working conditions on building, excavating, paving, sewer, roads, marine and other heavy construction. Includes new state road agreement.



ARC-WELDING ACCESSORIES—General Electric Co., Schenectady, N. Y. (28 pp., illustrated.) Gathered into one 8x10½-in. booklet are all the accessories that make up an arc-welder's kit of tools and protective devices necessary to the proper performance of his work and to his protection. Also included is a list of valuable, though not essential, gadgets that will increase the amount of work done, as well as add to its effectiveness.



TRACTOR SERVICE MANUAL—Tractor Division, Allis-Chalmers Mfg. Co., Milwaukee, Wis. (143 pp., illustrated, price \$1) An exceptionally comprehensive treatment of every detail involving care, operation and maintenance of company's Model M, 32-hp., gasoline-powered tractor. Large illustrations, cross-section views and properly labelled cutaway photographs assist reader in a clear understanding of the text. The manual should

prove invaluable to mechanics responsible for tractor maintenance and repair. A complete index adds to the reference value of the publication. Among a few of the chapter headings are lubrication, general operating instructions, adjustments and minor repairs, how to locate engine troubles, major repairs and overhaul, and allied equipment.



ELECTRIC ETCHERS—Ideal Commutator Dresser Co., 1285 Park Ave., Sycamore, Ill. (4-p. folder, illustrated) Describes and illustrates various etchers for use in marking sizes, names, numbers and other important information on such materials as alloys, steel, iron, bronze, marble, porcelain and glass. Brief mention of electric soldering tools and "3-in 1" electric cleaners for keeping machinery in condition.



ROOF COOLING SYSTEMS—Water Cooling Corp., 71 Nassau St., New York, N. Y. (8 pp., illustrated) While this pamphlet deals principally with mechanical draft cooling towers, there is illustrated and briefly described a spray canopy roof-cooling system designed to prevent transmission of outside solar heat through industrial building roofs, resulting in lowered inside building temperatures and a saving in insulation and air-conditioning equipment.



Every American Bosch aviation magneto gets a *precision* run in test to check the efficiency of our "modern New England craftsmen."

Here every ounce pays its own way

American Bosch industrial magnetos are available for essential work in all fields. Perhaps less spectacular than our aviation line, they are engineered to deliver the same dependable, trouble-free performance.



WHEN a flat-top swings into the wind and her warbirds race along the runway, nothing goes along just for the ride . . . every ounce of the plane's weight must pay its own way. To help squeeze the ultimate bit of energy from each drop of gasoline is the job of American Bosch magnetos. Remarkable advances in magneto design, these units not only deliver the *right* high-tension spark at the *right* split-second of time, but also open the way to altitudes far higher than ever before.

Secret of American Bosch *precision* mass production is our large staff of "modern New England craftsmen" . . . men and women highly skilled in specific jobs, turning out work to tolerances measured in millionths. This *new* New England craftsmanship has been supplied through American Bosch engineering, planning, training, and tooling. The same know-how directly serves designers, manufacturers, and users of gasoline and Diesel engines.

This "modern New England craftsmanship" is now putting on the pressure to help America win a decisive Victory. *American Bosch Corporation*.

AMERICAN BOSCH

AVIATION & AUTOMOTIVE ELECTRICAL PRODUCTS . . . FUEL INJECTION EQUIPMENT

MODERN CRAFTSMEN IN THE NEW ENGLAND TRADITION

"Reel" action at "X"

"Movies" are up front, too, for periods of relaxation. Keeping these "Reels" rolling, is one of our assignments — for the projectors are operated with lighting equipment powered by Briggs & Stratton gasoline motors. This is but one of scores of "special" applications, in addition to many major ways by which Briggs & Stratton motors are serving our armed forces.

OWNERS of 4 cycle air-cooled Briggs & Stratton motors are fortunate. They are not only assured of dependable power during the present emergency, but they know that these sturdy gasoline motors embody built-in features and quality that insure constant delivery of capacity power year after year. Now, when all equipment is being operated "around the clock", it is most important to keep your Briggs & Stratton motor in tip-top condition. It will pay in extra performance and even longer life.

A book containing Operating Instructions, Adjustment and Repair Information is available on request. When writing, be sure to mention the model letter of your motor.

BRIGGS & STRATTON CORP.
MILWAUKEE, WIS., U.S.A.

FOR VICTORY
Buy U. S. War Bonds

4 CYCLE
BRIGGS & STRATTON
GASOLINE MOTORS

TRUCK-MOUNTED CRANE — **Link-Belt Speeder Corp.**, Chicago, Ill. (Folder, illustrated.) Describing the advantages of their HC-70 Truck Crane when used either with hook block, clamshell bucket or a dragline bucket. Recommending this set-up for wrecking operations, for erecting steel for excavating or handling material, or for maintaining roads, the folder details some of the special features which give this piece of contractor's equipment its well-known toughness and power. Its sectional, hinge-connected construction makes it possible to take down the boom quickly and fold it at one side of the truck-driver's half-cab so that the entire crane can travel anywhere. It is claimed that frequently it can handle, with speed and economy, widely scattered jobs that would prove impossible for another machine.



ICE CONTROL FOR AIRPORT RUNWAYS — **Calcium Chloride Assoc.**, 4145 Penobscot Building, Detroit, Mich. Digest of material contained in Bulletin 27 on skidproofing and ice control practice under following headings: (1) Need for treated abrasives; (2) fall stockpiling; (3) crushing and screening grits; (4) methods of treating abrasives; (5) protecting stockpiles; (6) adding "sweetener" treatment; (7) ice removal practice; (8) advantages of calcium chloride.



INDUSTRIAL FENCES — **California Redwood Assoc.**, 405 Montgomery St., San Francisco, Calif. Data sheet presenting information on two standard types of fencing, one constructed of random width Redwood boards from 6 to 12 in., other of 12-in. boards with battens and fence cap. For each style of fence, complete materials list is presented for heights from 6 to 10 ft., inclusive. Sketches show all construction details. Redwood is said to be particularly adaptable for industrial fence construction because of its great durability under various types of soil and weather conditions, with or without paint; its low shrinkage, with little, if any, tendency to warp or split, and its fire resistance because of lack of resins or gums in its composition.



CHAIRMAN OF *Contractors' Pump Bureau*

R. B. HARVEY, Sales Manager of the Novo Engine Company, was appointed chairman of the Contractor's Pump Bureau at their annual meeting in Chicago.

The Pump Bureau is an organization composed of the principle manufacturers of contractor's pumps. This bureau determines all standards of the manufacture of pumps used in the construction industry.

Mr. Harvey has also been appointed recently to the Contractor's De-Watering and Supply Pump Manufacturer's Advisory Committee and the Air-Cooled Engine Industry Advisory Committee of the War Production Board.

These committees were appointed

POWER

and Traction



TO KEEP YOUR GRADERS ROLLING FOR VICTORY...

- ✓ Check condition of engine regularly.
- ✓ Change lubricating oil and renew filter elements every 100 hours of use.
- ✓ Lubricate all parts of grader regularly.
- ✓ Service air cleaner every 10 hours of use.
- ✓ Clean fuel oil filters at least every 60 hours.
- ✓ Don't ride clutch. Adjust clutch pedal when and as needed.
- ✓ Keep electrical system in good condition —check battery regularly.
- ✓ Keep lost motion out of grader—use adjustments for wear and replace parts worn out.
- ✓ Keep tires inflated to recommended pressure.

If you need help or advice on any of the above, see your local Adams distributor.

★ ★ POWER and TRACTION are what it takes to get mammoth army trucks over rough roads in all kinds of weather to bring vital supplies to the fighting fronts . . . POWER and TRACTION are enabling Adams Motor Graders also to work in soil conditions ranging from sticky mud to loose sand to complete wartime grading and ground leveling jobs quickly and economically . . . POWER and TRACTION are but two of the many features you'll like in Adams Motor Graders when once again you are permitted to buy equipment for use on peace-time projects!

J. D. ADAMS COMPANY • INDIANAPOLIS, INDIANA

Adams motor graders, leaning wheel graders, elevating graders, hauling scrapers, tamping rollers, bulldozers and road maintainers are used by allied forces throughout the world.

Adams
ROAD-BUILDING AND
EARTH-MOVING EQUIPMENT

ON EVERY CONSTRUCTION FRONT-



M.S.A.
SKULLGARDS
KEEP HEADS SAFE ON-THE-JOB!

IN ACTION on the biggest construction jobs and contracts of every size throughout the nation, these favorite work hats keep men on the job by keeping heads safe. Skullgard's laminated bakelite construction, one-piece molded, provides durability and resistance to impact proved by years of hard service—*comfort* proved by the greatest popularity enjoyed by any protective hat. 8 different models to choose from!



Type K—standard of the industry. Trim "doughboy" shape for all-around protection.

Write

for your copy of this descriptive M.S.A. Skullgard Bulletin. Fully detailed—ask for Bulletin No. DK-11.



MINE SAFETY APPLIANCES CO.

BRADDOCK, THOMAS AND MEADE STREETS
 PITTSBURGH, PA.

DISTRICT REPRESENTATIVES IN PRINCIPAL CITIES

to promote workable standards and greater simplification of procedure between the various manufacturers and the requirements of the War Production Board.

★ ★ ★

Housing

Within Housing

(Continued from page 45)

exact positions on the floor, were delivered together with all necessary studding, bracing, headers and upper plates. Sections of the wall were laid out on the paper-covered floor, were nailed together in a horizontal position, inspected, covered with tar paper, the redwood sheathing was nailed in place and, finally, the entire wall section was raised to a vertical position.

For the second floor, Cabot's double-thick quilt insulation was nailed to the joists with battens and oak flooring was toenailed in place and covered with paper as on the first floor. Materials for second-story walls were then delivered to the second floor as on the story below.

Over the usual rafter construction, mineral-surfaced roofing was nailed on, and the joints were swabbed with hot tar just before nailing. The exterior of the buildings got two coats of spray paint, the second coat of light grey being alternated with either green or red trim to match roofing paper color.

Inside walls were finished with Schumacher wallboard nailed to the studding and joints were covered with tape, glued in place so that a final paint coat gave a smooth continuous wall surface.

Contractor Personnel

A general contract for \$3,500,000 providing for construction of 1,740 apartments is held by the Robert McCarthy Co., San Francisco. Ted Johanns and Joe Cruise are general superintendents and Tom Curran is assistant general superintendent. This contract is one of several that make up the \$13,000,000 total. Will G. Corlett and Arthur W. Anderson, Oakland, are architects and engineers for the project as a whole. O. E. Carr is engineer in charge for the U. S. Maritime Commission.



WARS CAN'T WAIT ON WEATHER!

THAT'S why construction of factory buildings, airport runways, or concrete gun emplacements must continue through cold weather.

True, concrete hardening slows up as temperatures drop, but you can compensate for this natural slowness by adding calcium chloride to portland cement concrete. Engineers recognize this value and specify calcium chloride for speed and safety in concrete construction.

Reports of tests made at the National Bureau of Standards and other data, practical methods, etc., are contained in the new manual, "Early Strength Concrete." Write now for Bulletin 28 to the Calcium Chloride Association, 4145 Penobscot Building, Detroit, Michigan.

In Close Quarters

Pile Foundation

For Building

Addition Is Installed

Alongside Subway

(Continued from page 68)

building, the average penetration of the piles was only 12 to 15 ft. To provide against unequal settlement, however, piles of the same type were used in both the single cellar and the subcellar areas — concrete-filled steel tubes with a unit loading of 30 tons. The same type of support was used



FIVE-PILE PIER is ready for capping with concrete to support column of new building addition. Piles are steel cylinders driven to required depths and then filled with concrete. Close to pile cluster existing wall at left has been underpinned.

in constructing the addition to the building.

In addition to the necessity of working in cramped quarters and extremely close to the existing subway structure, the contractors encountered a number of large boulders which made the sinking of the steel pile cylinders difficult. These cylinders were 10 $\frac{3}{4}$ -in. o.d. steel shells which were filled with concrete after being driven to the required depths. Driving was done with a No. 1 Vulcan steam hammer working in leads hung from the boom of a crawler crane.

The job involved, also, the use of piles of the Pretest type for underpinning walls of adjacent buildings and the entrance to the subway. In this special type of support steel cylinders in short sections joined by steel couplings, are forced down underneath the wall to be underpinned

(Continued on page 86)

It's Done With DIAMOND ROLLER CHAINS

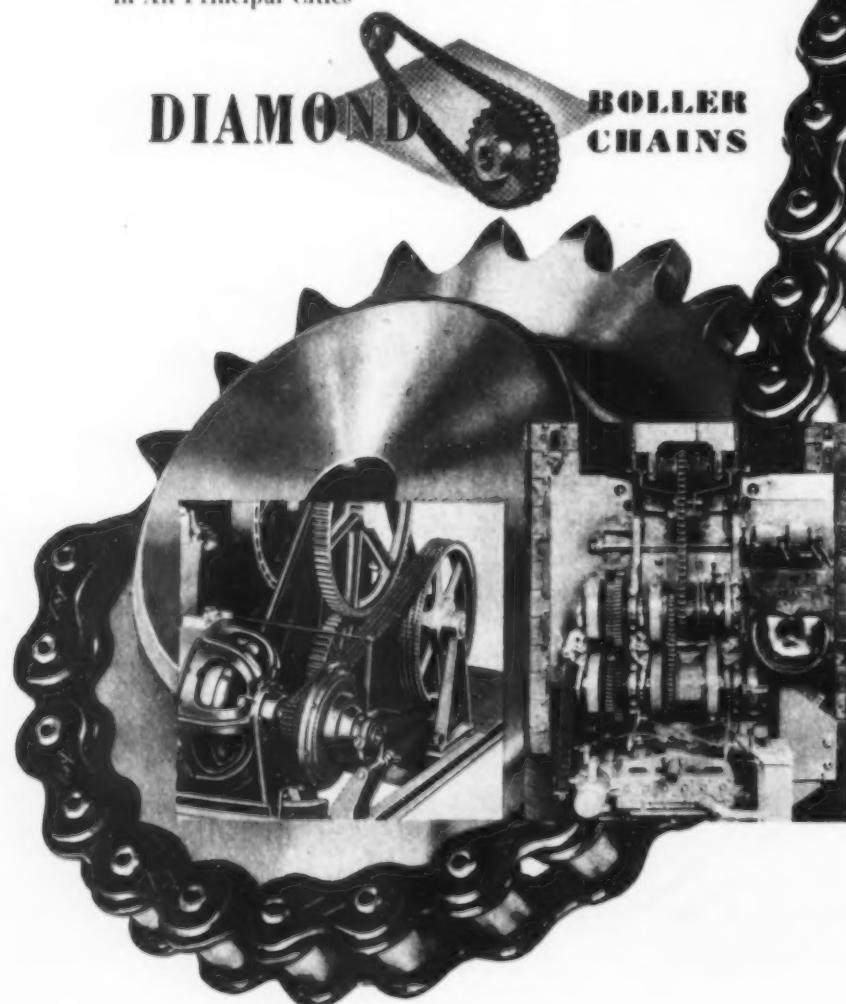
On leading makes of construction machinery, DIAMOND Roller Chain Drives have demonstrated their ruggedness, efficiency and capability to withstand shock loads and long hours of continuous operation.

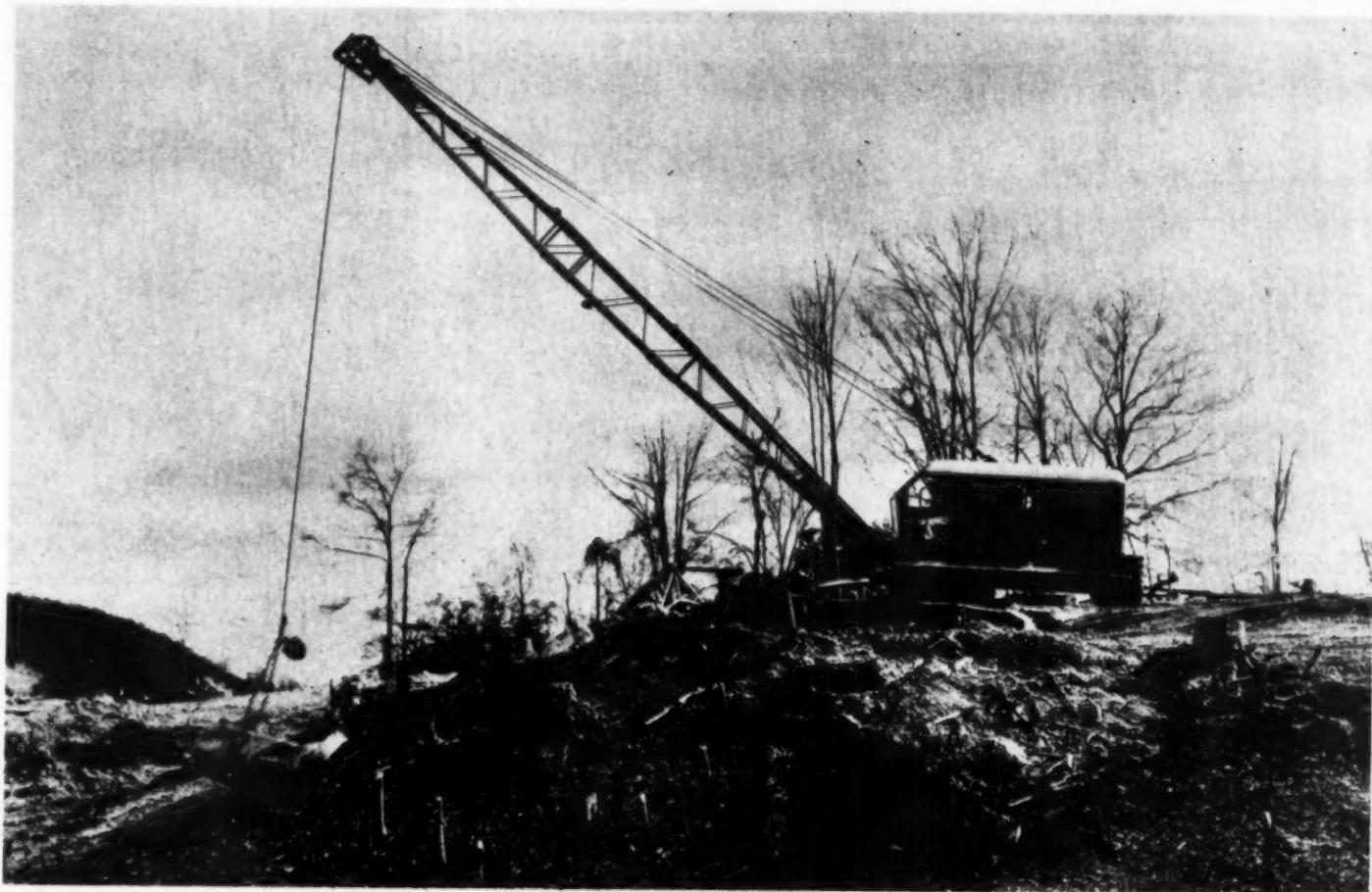
They are used on every type of equipment; — shovels, drag-lines, trenchers, scrapers, graders, loaders, screens, bucket conveyors, road rollers, pavers, concrete and asphalt mixing plants, trucks. They have done well the jobs for which leading builders and their engineers have selected them.

DIAMOND Roller Chain Drives put little strain on bearings because they do not depend on friction. They do not slip, — withstand frequent starting, stopping and reversing, and require a minimum of care.

No matter where you are operating, you can get greater uninterrupted yardage and help speed up the completion of projects needed for winning the War with Diamond Drives, — made by the largest exclusive manufacturers of roller chains in America . . . DIAMOND CHAIN & MFG. CO., 418 Kentucky Avenue, Indianapolis, Indiana. Offices and Distributors in All Principal Cities

DIAMOND ROLLER CHAINS





OSGOOD

recommends the continued purchase of War Bonds and Stamps— and the observance of preventative maintenance to keep your machinery running.

The
GENERAL
EXCAVATOR CO.
Sizes: $\frac{1}{8}$ - $\frac{1}{2}$ - $\frac{5}{8}$ - $\frac{1}{4}$
DIESEL - GAS - ELECTRIC
Associated with
THE OSGOOD CO.

The
HERCULES
COMPANY
HERCULES
IRONROLLERS
6 to 12 Tons
Diesel or Gasoline
Associated with
THE OSGOOD CO.

OSGOOD AIR CONTROL

the smooth, velvety, effortless control force with the operating ease and efficiency of steam. OSGOOD Air Control is simple in operation, easy to maintain, and costs next to nothing.

OSGOOD

—
1/2 to 2 1/2 Cu. Yd.
Diesel - Gas - Electric
THE OSGOOD COMPANY, Marion, Ohio

SHOVELS
SCRAPERS - CRANES
Crawler & Wheel Mounted

(Continued from page 84)

FOR BIGGER PAY-LOAD DIGGING

HAIFF HI-POWER

UP TO 7 PARTS OF CLOSING LINE

Exclusive four-position, wedge-block dead-ending that keeps line always centered over grooves in the sheaves... Highest closing power!

Buckets in stock at New York, Philadelphia, Baltimore, Atlanta, Richmond, Charlotte and Los Angeles... Write or wire for prices, delivery and catalog details.

GEORGE HAISS MFG. CO., INC., 139TH ST. & CANAL PL., NEW YORK

Mall VIBRATORS
SAVE as they SERVE

Mall PORTABLE POWER TOOLS

On 8 DIFFERENT JOBS

WET RUBBING SAWING DRILLING

Mall 1 1/2 H. P. GASOLINE POWER UNIT

• 8 Interchangeable Tools
Make Unit Easy To Keep Busy

★ VIBRATING — places low-water-cement-ratio concrete better and faster. It eliminates honeycombs and voids and expensive hand patching. It assures a better bond with reinforcement and permits an earlier stripping of forms.

★ WET RUBBING — one man can put a finer finish on 3 times the area possible with hand methods.

★ SANDING — saves time cleaning and feather edging form boards right on the job.

★ PUMPING — excavations — 1500 g.p.h. at 10 ft. head.

★ SAWING — squaring form boards to size and salvaging waste pieces for bracers, etc., with circular saw.

★ DRILLING — in wood, steel, brick and concrete.

★ ALSO WIRE BRUSHING and SHARPENING TOOLS

Air cooled gasoline engine delivers variable speeds from 1000 to 3700 r.p.m. and uses very little fuel.

Available for Victory Construction — full details upon request.

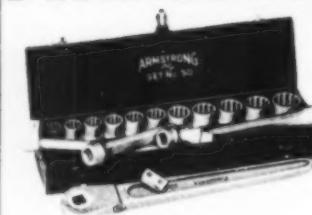
MALL TOOL COMPANY

7757 South Chicago Ave., Chicago, Illinois

ARMSTRONG

WRENCHES

- open end
- Box Socket
- Detachable Socket
- Construction Ratchets



There are ARMSTRONG Wrenches for your every need and each is the finest tool of its type.

ARMSTRONG Socket Wrenches extensions and handles are Chrome-Vanadium Steel. Ratchets are drop forged steel and the patented ARMSTRONG Drivelock locks sockets, driver, ratchets and handles to each

other — will not knock or pry apart, sockets can not fall off.

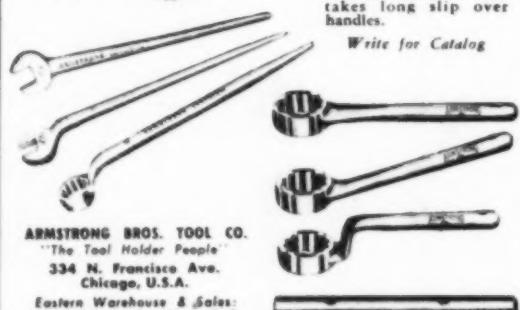
ARMSTRONG Giant Construction Ratchets are drop forged steel. Nut sockets are machined from solid bar stock.

ARMSTRONG Drop Forged



Structural and Construction Wrenches come in several types in high carbon or Chrome-Vanadium steel. Large stub end box socket wrench takes long slip over handles.

Write for Catalog



ARMSTRONG BROS. TOOL CO.
"The Tool Holder People"
334 N. Francisco Ave.

Chicago, U.S.A.
Eastern Warehouse & Sales:
199 Lafayette St., New York



BOULDERS CAUSED DAMAGE during driving of some of the piles, requiring withdrawal of crumpled steel casings.

short I-beam posts which are wedged against the under side of the footing to allow the jacks to be removed.

On this project of constructing an addition to the Dime Savings Bank Building in Brooklyn, Halsey, McCormack & Helmer were the architects, Charles L. Lange was consulting engineer; Edward Corning Co. was the building contractor; and Spencer, White & Prentis, Inc., was foundation contractor.

★ ★ ★

Tools in
Expert Hands
Restore
Used Equipment

(Continued from page 61)

ably 200 less than a year ago, because a large number have been taken over in that time by the Army and Navy under recapture agreements.

Rebuilding, manufacturing and rental of equipment are not the only activities of the construction equipment department, which acts also in its own territory as sales representative and distributor for a number of leading equipment manufacturers:

(Continued on page 88)

Why PREforming Conserves Steel, Makes Wire Rope Last Longer

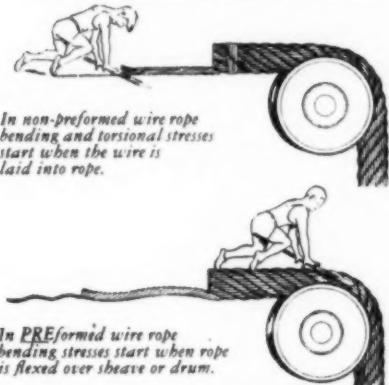
(Note: More and more wire rope users change to PREformed rope each year. During peacetime the reasons for changing from ordinary to PREformed wire rope were primarily two: the cost is lower; PREformed is easier to handle.

Today, with our nation at war and with steel at a premium, there is another and most important reason for using PREformed. It lasts much longer under high speed, severe bending and continuous operation. PREforming thus conserves steel. It conserves workmen's time; rope changes are less frequent. It reduces the accident potential; there is no wickering to harm hands or damage sheaves.)

There are two kinds of wire rope. One is called Regular, or ordinary, wire rope. The other is known as PREformed.

In ordinary rope wires are held together under tension. The wires are laid into the rope by bending them to the desired shape. Bending and torsional stresses thus remain in the rope . . . are kept under control by seizing the ends of the rope.

If the wire breaks, it immediately wickers. If the seizing breaks, the strands



and rope wire both wicker. This causes damage and delay. In PREformed wire rope, the strands and wires are pre-shaped to the exact curvature they will

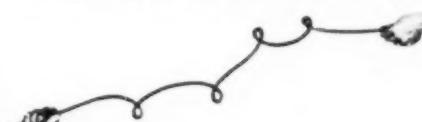
take in the finished rope. Bending and torsional stresses are eliminated (except of course when the rope bends over a sheave). If a wire breaks, it does not wicker but remains relaxed, thus causing no delay or damage.

Advantages of PREforming

PREformed wire ropes are like shoes that have been broken in. Instead of being stiff and unwieldy, they are flexible, easier to handle.

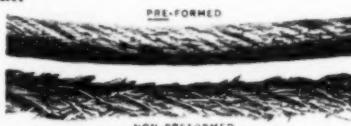


They are better adapted to bending and spooling, also. They resist kinking



when the rope is not under load.

PREformed wire ropes are easier to handle also because broken wires lay flat.



And finally, most important, PREformed wire ropes have greater resistance to bending and fatigue. This is



another way of saying that they last much longer, do a better job when the pressure is on, as it is today in war production.

When next you need wire rope, consider seriously the purchase of PREformed wire rope. Today the job we must all do is the "best" job possible. When it comes to wire rope there is no question as to which does the "best" job. It's PREformed.

Consult with Macwhyte

Don't overlook the help that Macwhyte engineers will gladly give you on any wire rope problem. Their advice gained from many years' work on all kinds of jobs is yours for the asking. Let us know the kind of work to be done; we will tell you the rope best suited for the job.

And this we urge you to do: take extra care of your present ropes. Inspect them regularly; lubricate them often. By so doing you can make them last longer and thus aid the war effort. That's what you want; that's what your country asks of you.

This is Number 13 in a series of informative articles prepared by the Macwhyte Company to help wire rope users obtain better and longer service from ropes on the job. All articles in this series are available on request.



MONARCH Whyte Strand PRE-FORMED WIRE ROPE

Macwhyte premier wire rope, famous for its strength, toughness, and internal lubrication.

NO. 632

MACWHYTE COMPANY

WIRE ROPE

2940 FOURTEENTH AVE.

KENOSHA, WISCONSIN



Manufacturers of MACWHYTE PREformed and Internally Lubricated Wire Rope
MACWHYTE Special Traction Elevator Cable MACWHYTE Braided Wire Rope Slings MACWHYTE Aircraft Cables and Tie-Rods

NOW you can get 10 basic books of DAY-IN-DAY-OUT VALUE TO THE CIVIL ENGINEER in one handy volume that—

... answers your questions in any division of civil engineering; ... blends theory, practice and fundamentals equally;
... is comprehensive, up-to-date and authoritative; ... is reasonably priced.

CIVIL ENGINEERING HANDBOOK

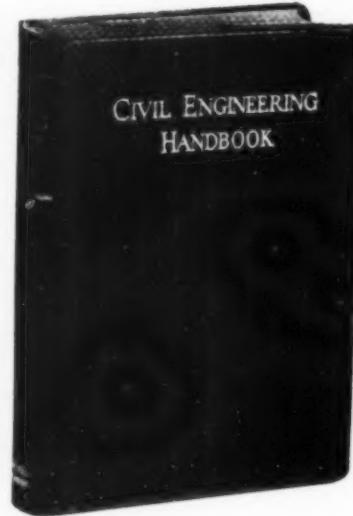
Editor-in-chief: Leonard C. Urquhart, Professor of Structural Engineering, Cornell University. Second Edition, 870 pages, 6 x 9, over 900 illustrations and diagrams \$5.00

HERE are the fundamentals of the various subdivisions of civil engineering for men who actually plan, select, design, and construct civil engineering structures and projects. In each division a noteworthy specialist has contributed a compact treatise, developing fundamental theories as well as stating more involved ones, making the book not only a comprehensive reference work of modern civil engineering practice, but also adaptable for systematic study of any of the fields represented in it.

In this new edition you will find latest surveying practice carefully defined; new developments in highway and railroad work thoroughly covered; specialized recent data on design and construction of framed structures; new specifications for concrete and steel design to conform to latest approved specifications; important new data on foundations, sewerage and water supply.

Here in one handy volume is the practical, up-to-date information you need on:—

- Stadia surveying
- Land surveying
- Topographic mapping
- Hydrographic surveying
- Railway turnouts, connecting tracks and crossings
- Widening, spiraling and banking of highway pavements
- Highway administration and finance
- Highway materials and tests
- Construction costs of roads and pavements
- Mechanics of Materials
- Fluid pressure
- Pipes and open channels
- Flow of viscous fluids
- Measurement of flowing water
- Roof trusses
- Dead-load stresses in bridge trusses
- Lateral forces on bridge trusses
- Arches
- Slope-deflection
- Moment distribution
- Riveting and welding
- Bearing plates and grillage beams
- Bridges
- Mill Buildings
- Multi-story buildings
- Design of concrete mixtures
- Mixers and mixing
- Buildings and walls, footings and foundations
- Concrete arches
- Box culverts and rectangular frames
- Properties of soils
- Mechanics of soil resistance
- Caissons
- Underpinning
- Sewerage and Sewage Disposal
- Intakes and dams
- Ground water
- Aqueducts and pipe lines
- Pumps and motors
- Quality of water
- Water purification



Add it to your library

Everything about this new handbook points to its usability: its large page size, large illustrations and type size; its many illustrative problems; and the comprehensive selection of reference tables and formulas to augment the text matter. You can use it to check your methods, keep abreast of the field, and solve many specific problems of practice. See it—add it to your library today—as a new, needed, and valuable engineering tool.

SEE IT 10 DAYS — MAIL THE COUPON

McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York

Send me Urquhart — Civil Engineering Handbook, 2nd Edition, for 10 days' examination on approval. In 10 days I will send \$5.00, plus few cents postage, or return book postpaid. (We pay postage on orders accompanied by remittance.)

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Position _____

Company _____ C.M. 2-43

(Books sent on approval in U. S. and Canada only.)

(Continued from page 86)

- (1) J. D. Adams Co., (2) Barber-Greene Co., (3) Buffalo-Springfield Roller Co., (4) Chain Belt Co., (5) Cleveland Tractor Co., (6) Daybrook Hydraulic Corp., (7) Electric Machinery Mfg. Co., (8) Euclid Road Machinery Co., (9) Fairbanks, Morse & Co., (10) Flexible Road Joint Machine Co., (11) Gardner-Denver Co., (12) Heltzel Steel Form & Iron Co., (13) Ideal Electric & Mfg. Co., (14)



ROUGH EDGES of crowd pinion (on same unit with travel pinion) of Lorain 75 shovel are ground smooth with Rotor airpowered grinder. Pinions have given many years of service, and they will give many more without rebuilding.

Independent Pneumatic Tool Co., (15) Iowa Mfg. Co., (16) Lincoln Electric Co., (17) Marlow Pumps, (18) Murphy Diesel Engine Co., (19) Owen Bucket Co., (20) Page Engineering Co., (21) Thew Shovel Co., (22) Winslow Government Standard Scale Works.

Abundance of facilities in the plant makes it practically independent of outside help for replacing or rebuilding any worn or damaged parts in its own shop machines. A replacement part can be turned out in a short time by means of the forge, welding and machine-shop facilities.

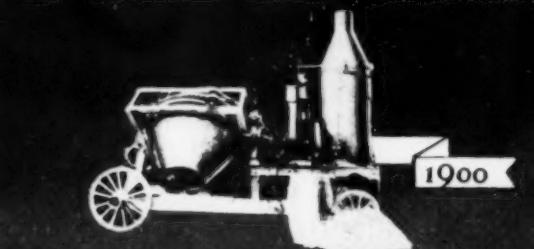
Accompanying photographs present an overall summary of common operations in various shops. The picture survey is unavoidably spotty; space and time limitations prevent putting every operation in the photographic record. Enough is shown to indicate the range and character of the rebuilding and reconditioning jobs performed in the shops.

One Month's Rebuilding Work

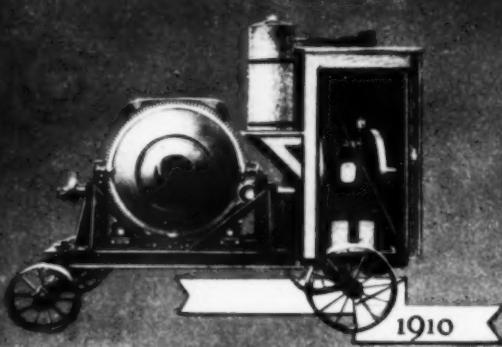
As an indication of the amount of work accomplished by the plant, the construction equipment department in one representative month took in (Continued on page 90)

CONCRETE MIXERS

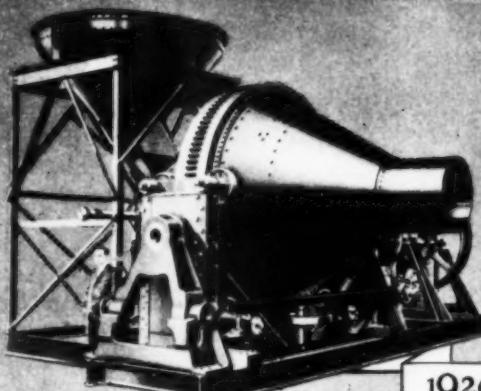
by



1900



1910



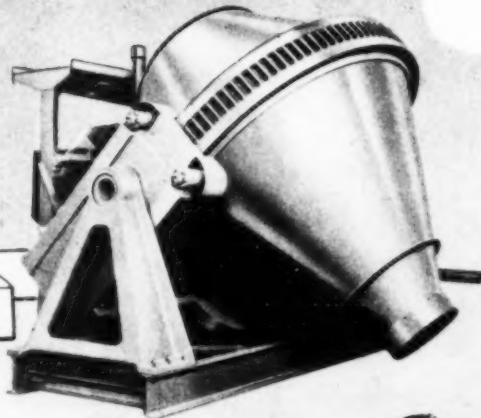
1920

*Every Year they become
BETTER and BETTER*

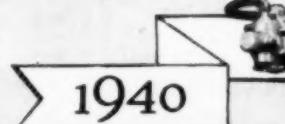
43 years ago, the late Mr. Thomas L. Smith designed the first duo-cone drum, tilting type, concrete mixer. Judged by today's standards it was a crude machine, nevertheless, the forerunner of the famous Smith line of concrete mixers that has made history in the construction industry. Every year, improvements and refinements were added that resulted in greater convenience, speed and efficiency. Today, Smith is the acknowledged leader in the industry. Smith Mixers have definitely proven their worth, over and over again, on the world's greatest concrete projects: Boulder Dam, Marshall-Ford Dam, Cherokee Dam, Watts Bar Dam, San Francisco-Oakland Bridge, Norris Dam, Muscle Shoals, Panama Canal and many other world-famous projects. All sizes available, up to 4-yards per batch.

The T. L. SMITH COMPANY

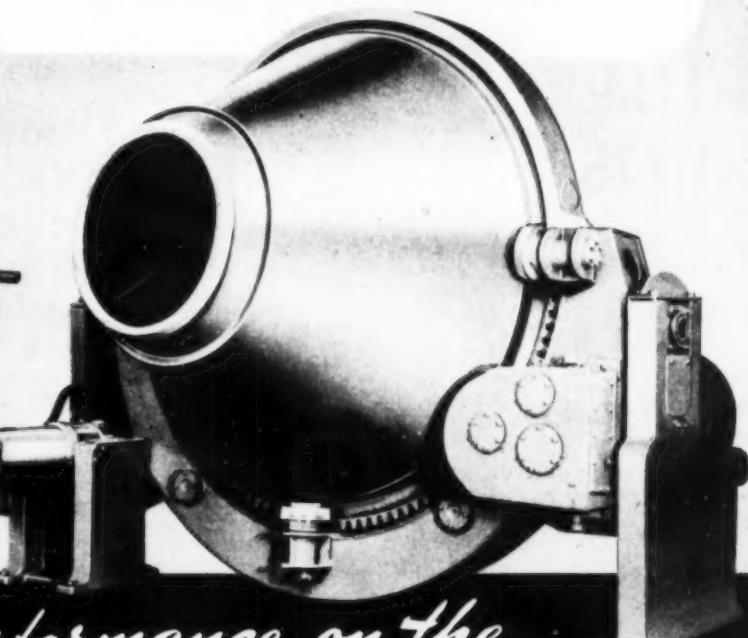
2851 North 32nd Street, Milwaukee, Wis., U. S. A.



1930



1940



Famous for Performance on the
WORLD'S GREATEST PROJECTS

"OH BOY! I SURE
AM GLAD I BOUGHT
STERLINGS!"



STERLING WHEELBARROW CO., MILWAUKEE, WIS.

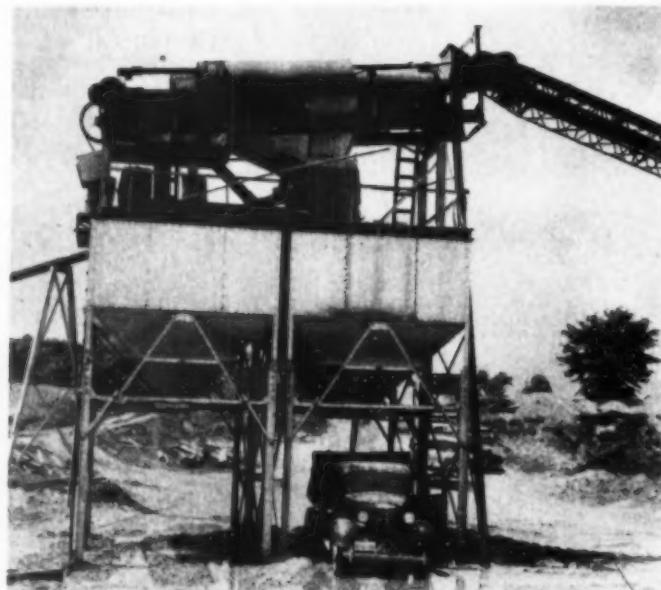
Sterling
WHEELBARROWS



Look for this Mark of
STERLING Quality

YOU CAN
PRODUCE IT
FASTER
WITH
BUTLER
BINS

In any aggregate plant, whether for crushing, washing, or screening, it is *engineered design* that makes the difference. And that is what you are offered with Butler bins. More than twenty years' experience in designing and laying out plants of this kind have equipped Butler engineers with the ingenuity and experience to design *your* plant



to do its job better and faster.

In these days especially, no one can afford to be too little or too late. Assure yourself of maximum production and efficiency by getting in touch with your Butler engineer today.

BUTLER

BIN
COMPANY

WAUKESHA
WISCONSIN

(Continued from page 88)

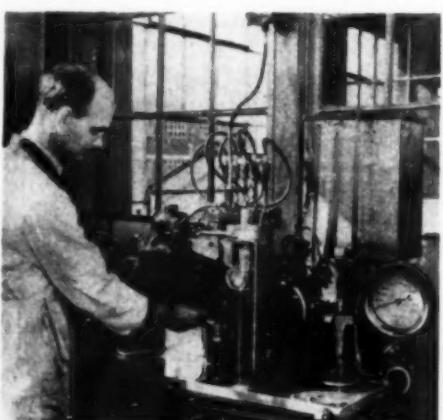
477 rebuilding, repair and manufacturing jobs, 203 for the contractors' equipment shop and 274 for the truck and engine shop. Many of the jobs were too large to be completed the same month, but the output of finished work during the period was equivalent to the incoming orders.

Equipment shop jobs for the month ranged all the way from rebuilding 2-*yd.* shovels, which might take 60 days, to small repairs and adjustments that could be completed in a few hours. On shovel repairs, for example, the month's list called for re-



I-BEAM TRAILER hooked to diesel tractor is special 75-ton-capacity unit designed for hauling shovels and cranes up to 2½-*yd.* size.

building six dipper sticks, repairing engines, repairing and changing booms, rebushing bearings, rebuilding track parts and sprockets, relining clutches, welding broken and worn parts, doing press work on pinions and drives, cutting gear teeth and keyways, rebuilding and machining shafts and retipping dipper teeth. Work was in progress on repairs or



FUEL INJECTION TEST STAND for Cummins diesel engines is operated by RAYMOND T. ROSS, technician in charge of diesel fuel injection shop, who designed and built this equipment.

rebuilding for twelve shovels during the month. Two came in for complete rebuilding during the month. At the same time the shop was building, rebuilding or repairing front-end attachments for cranes, backhoes and

(Continued on page 92)

"Gulf Quality Lubricants are good job insurance,"

say many leading contractors—on all types of construction projects

"Wartime restrictions on repair parts and new equipment make proper lubrication a must."

"Now that new equipment and repair parts are hard to get even with high priorities, proper lubrication is a vital necessity for the completion of a tough job on schedule," says a highway contractor. "More than ever we rely on the quality lubricants recommended by a Gulf Service Engineer—they give our equipment all-weather protection, help us steer clear of breakdowns and mechanical troubles."

More and more leading contractors with heavy work schedules are standardizing on Gulf higher quality lubricants and getting the benefits of Gulf cooperative engineering service. For they know that breakdowns and mechanical troubles are serious matters today—and that costly delays can be prevented by closely following Gulf Engineering recommendations.

You, too, will find it *good insurance* to use Gulf quality lubricants on your next contract. Call in a Gulf Service Engineer today and ask him to check over your equipment. He will recommend lubricants of greater stability and stamina that are exactly suited to your equipment and operating conditions.

The services of a Gulf engineer—and the Gulf line of more than 400 quality lubricants—are available to you through 1200 warehouses located in 30 states from Maine to New Mexico. Write or 'phone your nearest Gulf office today.

For Victory Buy United States War Bonds and Stamps

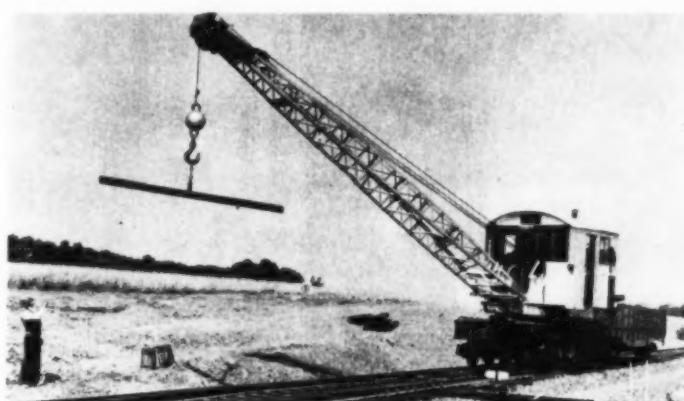
GULF REFINING COMPANY
GULF OIL CORPORATION
Gulf Building, Pittsburgh, Pa.



Benjamin Foster Company, Philadelphia, Pennsylvania, is removing a hazard to important defense plants at York, Pennsylvania, by widening and deepening the channel of this stream. Gulf lubricants insure this contractor against breakdowns to equipment under the severe service conditions encountered on this job.



Hinman Brothers, Pittsburgh, Pennsylvania, are grading and paving $3\frac{1}{2}$ miles of highway in the reconstruction of Route 40 near Somerfield, Pennsylvania. The contractor gives Gulf lubricants and fuels a large share of the credit for their being well ahead of a tough contract schedule.



Ferguson and Edmundson are laying 46 miles of railroad track in this munitions dump in Pennsylvania. This contractor uses Gulf lubricants and fuels to insure against unnecessary time out for their equipment on this urgent job.

SAFE



Blackhawk Hydraulic Jacks have time-proved their *dependability* in all types of service! Their rugged construction and brute strength assure a liberal margin of safety over and above full rated capacities — and eliminate lost time, damage to equipment, and injuries to workmen caused by jack failures. What's more, Blackhawk Hydraulics — even the big 50-tonners — can be carried, positioned, and operated easily and *safely* by one man!

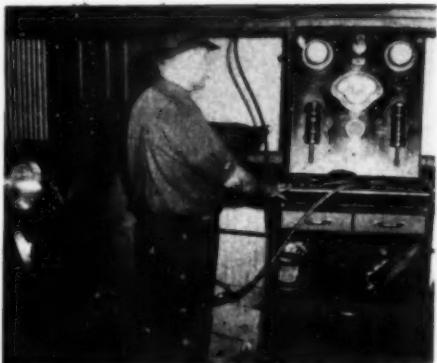
A Product of **BLACKHAWK MFG. CO.**
Dept. J2323 Milwaukee, Wisconsin



(Continued from page 90)
draglines and was overhauling one crane.

Other machines in process of rebuilding and repair included tractors, pavers and mixers, conveyors, spreaders, finishers, scrapers, well drills, screening and washing plants, crushers, bins, ditchers, hoists, blade graders, elevating graders, generator sets, harrows, cultivators, rollers and buckets for digging and material handling. Power units to be taken down for repairs numbered nine diesel engines, ten gasoline engines and ten electric motors.

During the same period the truck and engine shop received orders for



EXHAUST ANALYZER connected by hose to truck exhaust pipe back of muffler tests fuel carburation. Central dial on board of Weidenhoff tester is exhaust gas meter which indicates whether mixture is too rich or too lean.

36 complete truck conversions (manufacturing jobs) and for rebuilding or repair of 62 engines, about half and half diesel and gasoline. About 30 crankshafts were built up by metalizing and ground to specified dimensions. All other ordinary repair and replacement jobs for engines, bodies, hoists, springs, wheels, axles, shafts,



RECORD PLATE similar to this one goes on every engine or piece of equipment rebuilt by L. B. Smith, Inc.

transmissions, differentials, water and fuel systems, ignitions, carburetors, fuel pumps, injectors, power takeoffs came through in usual large numbers.

This volume of work could be completed in the time noted only by a large force of capable mechanics

(Continued on page 94)

Koehring Cranes Get in the SCRAP



Because their yards are equipped with Koehring Cranes, many scrap dealers have been able to handle easily the extra flow of steel scrap which has come to them through concerted scrap drives throughout the nation.

Powerful Koehring Cranes, with clamshell or orange peel buckets or heavy-duty magnets help speed the scrap to the balers and into the cars on its way to the steel mills.

The same features which have made Koehring Cranes so popular in other fields prove extremely useful in handling scrap. Some of these features are: accurate boom control...hoisting while swinging...positive load spotting...all welded construction.

KOEHRING COMPANY • Milwaukee, Wis.



HEAVY-DUTY CONSTRUCTION EQUIPMENT

RED EDGE



MONONGAH



PINNACLE



THREE STAR



KNOXALL



BRONCO



CARTER



RAM



TOOLS OF WAR.. and Peace

Ever since the days of Bunker Hill, when Ames Shovels played an important part in that famous battle, the Ames line of shovels have contributed their part toward winning wars.

Today, in Africa, New Guinea, Guadalcanal, Russia, Alaska and the hundreds of training camps in the United States, Ames shovels have again become tools of war.

The famous brands comprising the Ames line, each a leader in its field, are as popular with armed forces as with civilians in times of peace. If it's an Ames brand, you can depend upon it for quality and serviceability . . . in War or in Peace.



AMES BALDWIN WYOMING CO.

PARKERSBURG, W. VA. NORTH EASTON, MASS.

SHOVELS • SPADES • SCOPS • FORKS
HOES • RAKES • POST HOLE DIGGERS

O: AMES



OPTIMUS



PEERLESS



FAVORITE



TWO STAR



HUSKY



PONY



COLT



(Continued from page 92)

equipped with the proper tools. The employee roll of 600 already has been mentioned. Of this number, 250 work in the shops. Tools and machines used by these men are indicated in a table accompanying these notes.

Management

Capable, energetic management keenly alive to the progressive improvement of construction equipment and shop tools is the directing force responsible for the plant's growth and achievements. At the head of the organization, L. B. Smith, president, chooses competent men to manage the business and gives them full authority to make decisions and carry out plans. Edward A. Woolford is acting manager in charge of the construction equipment department in the absence of C. G. Hewitt, who has been called into service by the Corps of Engineers, U. S. Army. Rebuilding operations are under the direction of Arthur Craig, superintendent of the construction equipment shop, and Charles H. Edwards, superintendent of the truck and engine shops.

**Machine Tools and Power Tools
Construction Equipment Department
L. B. Smith, Inc., Camp Hill, Pa.**

The Care and Maintenance of Rock Crushers

The "Do and Don't" of Crusher Lubrication

Today lubrication is more important than ever before. Lack of grease can cause costly bearing failures and bearings are made of vital, much needed alloys.

These ten simple rules, strictly observed, will help your crusher to stay on the job until the day when parts are plentiful and new crushers obtainable.

1. Don't keep lubricant containers near crushing plant—as float dust is penetrating and a little grit in your grease may ruin a bearing.

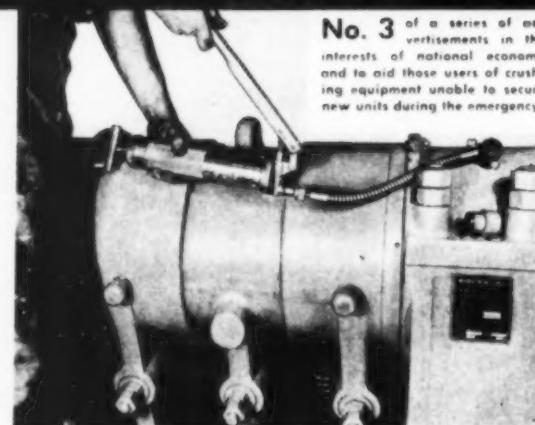
2. Don't put oil or grease in bearings or fittings until they have been wiped off with clean rags. Flush them with a thin oil—don't use kerosene.

3. Use only clean containers.

4. Make it a practice to inspect bearings often—at least four times daily with bronze bearings; once daily with roller bearings—checking them for over-heating.

5. Don't use cheap lubricants—they cost more in the long run.

6. Place a burlap bag saturated with crank case drainings on top of the lower end of the toggle—it helps keep out dirt and lubricates the lower toggle seat.



No. 3 of a series of advertisements in the interests of national economy and to aid those users of crushing equipment unable to secure new units during the emergency.

7. Keep adjustment wedges and screws clean. Oil regularly to prevent rust. Unless already enclosed, wrap screws with cloth, tied on, to keep out grit.

8. Squirt out a shot of grease from gun before greasing to clean nozzle.

9. Don't over-oil or grease. Too much lubricant can overheat bearings. Use thinner lubricant in cold weather. Notice oil level plugs or name plates indicating quantity to use.

10. Don't keep adding oil when it should be changed.

Formerly
UNIVERSAL CRUSHER CO.
Cedar Rapids, Iowa

UNIVERSAL ENGINEERING CORP.,
327 8th Street West

UNIVERSAL
CRUSHERS. PULVERIZERS. COMPLETE PLANTS. SPREADEROLLERS. PORTABLE ASPHALT PLANTS

LARGE MACHINE TOOLS

- 13 lathes
- 8 drill presses
- 2 milling machines
- 3 shapers
- 6 boring machines (vertical mill, vertical and horizontal bar, line, and connecting-rod)
- 3 presses (axle, trackpin and vertical)
- 3 shears
- 3 cutting and threading machines (pipe and bolt)
- 2 trip hammers
- 1 crankshaft grinder
- 1 piston grinder
- 1 press brake
- 1 internal keyseater
- 1 slotted
- 1 punch
- 1 hand miller
- 1 forming rolls
- 1 sheetmetal bender

WELDING SETS

- 5 Lincoln 300 amp., electric-motor-driven
- 2 " 200 "
- 1 " 150 "
- 1 P & H 200 "
- 1 Westinghouse 300 amp."
- 1 National spot welder

VALVE TOOLS

- 1 valve refacer, $\frac{3}{4}$ -in. capacity (Hall)
- 1 " " $\frac{5}{8}$ -in. (Sioux)
- 1 " " $\frac{1}{2}$ -in. (Sioux)
- 1 valve seat grinder, 3-in. capacity (Hall)
- 1 " inserter, 3-in. (Hall)
- 1 valve grinder (Black & Decker)

ELECTRIC DRILLS

- 7 $\frac{1}{2}$ -in. (4 Thor, 1 Syntron, 1 Van Dorn, 1 Craftsman)
- 3 $\frac{5}{8}$ -in. (2 Van Dorn, 1 Craftsman)
- 2 $\frac{3}{8}$ -in. (1 Black & Decker, 1 Thor)

(Continued on page 96)



“..for accomplishing more than seemed reasonable or possible a year ago”

— Robert P. Patterson, Under Sec'y of War



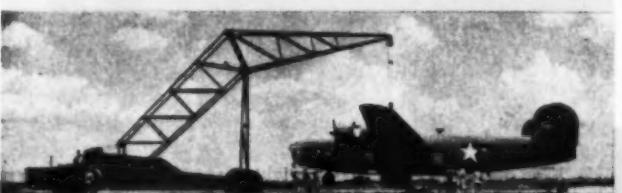
Rugged LeTourneau Dozers, Carryalls and Cranes, used by U. S. Army Engineers and contractors, help punch out 1650-mile Alcan Highway in record breaking time.



The M-20 LeTourneau Tractor Crane was developed for Marines and Engineers primarily for lifting heavy, compact loads, but this one was quickly put to use picking up, hauling and loading a crashed bomber onto truck at a large air base.



Fleet of 22 LeTourneau units, Tournapulls, Carryalls, Dozers, Cranes, Rooters and Sheep's Foot Rollers, build airports and supply roads in Africa.



LeTourneau B-30 Bomber Crane built especially for Army Air Force to quickly lift and haul crashed bombers to keep runways clear. Lifting capacity 60,000 lbs., 35 ft. from wheels; travels 18 m.p.h.; giant tires permit travel on runways.

Employees Triple Production

January 6 the Army-Navy "E" unfurled alongside the National Colors and the Minute Man Flag above our factory. It was awarded to the Men and Women of R. G. LeTourneau, Inc., because they have tripled production since 1940, because they have quickly designed and put in production many special Cranes, Carryalls and Dozers for land, air and sea forces . . . because they accomplished "more than seemed reasonable or possible."

You Have Helped

You and LeTourneau - "Caterpillar" dealers have helped us, too. We've been able to deliver more to the Armed Forces because you've been reasonable and patient in your demands for new equipment and parts, because you've kept your old equipment in fighting shape at a time when war has made impossible our usual peacetime deliveries to you. We and our dealers have done our best to get as much equipment and parts to you as possible, and we'll continue to do so . . . but, the Armed Forces must come first. They need so much equipment there just isn't enough for everyone, even with our tripled "E" production record.

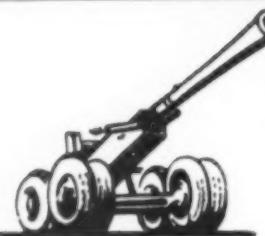
You, on thousands of peacetime jobs, have helped us develop this tough, cost-cutting equipment which "has what it takes" to step right into the toughest jobs of combat service. When peace comes again, our increased war production capacity and new war-proved models will mean even better service and better equipment than you've had before . . . probably "better than has ever seemed possible." Meanwhile, LeTourneau - "Caterpillar" dealers stand ready to provide you with parts and repair service 24 hours a day, 7 days a week. Use them for Victory.

LETOURNEAU

PEORIA, ILLINOIS - STOCKTON, CALIFORNIA

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There is a JACKSON VIBRATOR for every concrete placement job—SO—if you have concrete to vibrate see us—we'll (1) send literature, (2) quote prices and (3) quote deliveries if you wish.

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ELECTRIC TAMPER & EQUIPMENT CO., LUDINGTON MICHIGAN

Jackson VIBRATORS

Question: "We've got 17½' of water in fine sand.
Will steel sheeting be necessary?"

Answer: "No sheeting—wood or steel—required.
Time and \$\$\$ saved!"



See us about a Moretrench Wellpoint System for your next wet job.

MORETRENCH CORPORATION

90 WEST STREET, NEW YORK

Rockaway, New Jersey

Chicago, Illinois

New Orleans, Louisiana

(Continued from page 94)

8 ½-in. (4 Black & Decker, 2 Thor, 1 Syntron, 1 Van Dorn)

1 ½-in. (Thor)

3 ¾-in. (1 Van Dorn, 1 Black & Decker, 1 Cincinnati)

1 ¾-in. (Van Dorn)

AIR DRILLS

1 ¾-in. chuck (Thor)

ELECTRIC GRINDERS

3 6-in. wheel (1 Stanley, 1 Black & Decker
1 Sioux flexible-shaft)

AIR GRINDERS

6 6-in. wheel (5 Rotor, 1 Ingersoll-Rand)
3 2-in. wheel (Rotor)

AIR HAMMERS

5 chipping hammers (3 Ingersoll-Rand,
2 Chicago Pneu.)

5 riveting hammers, ½-in. chuck (2 Boyer
and 1 Keller-Chicago Pneu., 1 Ingersoll-
Rand, 1 Thor)

3 rivet busters (2 Thor, 1 Ingersoll-Rand)

2 air hammers (1 Boyer-Chicago Pneu., ¾-in.
chuck, 1 Ingersoll-Rand 1½-in. chuck)

AIR REAMERS AND WRENCHES

3 1¼-in. reamers (Thor)

2 1¼-in. close-quarter reamers (1 Thor,
1 Ingersoll-Rand)

3 wrenches, ½-, 1- and 1¼-in. nuts
(Ingersoll-Rand)

ELECTRIC SHEARS

2 16-gage sheet (Stanley)

3 14-gage sheet (Stanley)

1 light tin sheet (Thor)

ELECTRIC WIRE BRUSH

1 8-in. wheel (Black & Decker)

WOOD SAWS

1 air saw (Ingersoll-Rand)

1 electric saw (Black & Decker)

★ ★ ★

Airport Paving

By Road-Mix Methods

(Continued on page 67)

of last year and was completed within the 120-day limit of a contract supervised by the U. S. Engineer Department.

The average of all bids submitted for the originally contemplated gravel base plus the 2-in. hot plant-mix top—not including the item for grading—was \$980,000, whereas the bid of the contractor to whom the work was awarded on the basis of the alternate items totaled \$687,000, representing a substantial difference in cost between the two types of surfacing work. Actually, however, the cost differential was less than that indicated by the foregoing figures, due to an apparent high price on grading

(Continued on page 98)

Guard Against "Time Out"!

EVEN A CHAMPION
NEEDS THE RIGHT KIND
OF CARE TO KEEP
IN TOP CONDITION
for the
TOUGH JOBS AHEAD



Here's a way to keep your Link-Belt Speeder hammering away at the important production goals that lie ahead . . . First, if you have not already done so—establish a regular inspection routine, scheduled at definite intervals that will prevent the occurrence of a maintenance mishap or oversight. Keep the machine clean and properly lubricated at all times; check the treads, chains, brakes, clutches; tighten bolts and nuts.

Remember—today, more than ever, proper maintenance of essential machinery is vital, and *all* machinery is essential!

ECOT



LINK-BELT SPEEDER

LINK-BELT SPEEDER CORPORATION, 301 W. PERSHING ROAD, CHICAGO, ILL.
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**SHOVELS-
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**A PAGE AUTOMATIC
DRAGLINE BUCKET WILL
BOOST PRODUCTION
ON YOUR JOB TOO!**



On YOUR Coal Stripping, Air Base, Cantonment, Levee Building or General Construction job—PAGE AUTOMATIC DRAGLINE BUCKETS will BOOST PRODUCTION . . . make the most of Manpower and Machine!

A Page AUTOMATIC Dragline Bucket DIGS RIGHT IN. It is so shaped and designed that it AUTOMATICALLY lands in digging position with ALL its weight on the teeth. This means FASTER DIGGING AT ANY DEPTH . . . More dirt moved per shift.

Dragline operators on urgent "Victory" projects all over the nation depend on Page AUTOMATIC Dragline Buckets to get their jobs done F-A-S-T-E-R. They know that a Page Bucket will outdig any other bucket of equal size and weight.

PAGE ENGINEERING COMPANY • CHICAGO, ILLINOIS

PAGE
Automatic
DRAGLINE BUCKETS

★ BOOST PRODUCTION • KEEP AMERICA STRONG ★

(Continued from page 96)

by the successful contractor. However, the low bid of \$1,450,000 on the alternate items, including grading, for the completed job was \$160,000 less than the next lowest bid and was \$210,000 less than the average of all bids submitted.

In addition to the asphaltic paving, the contract included five sections of concrete taxiways for servicing planes and also concrete "hard stands" where gasoline spillage would

Major Equipment Units Used

- 6 Oshkosh 4-wheel drive tractors and 17-cu.yd. carrying scrapers
- 5 LeTourneau carryalls with RD8 Caterpillar tractors
- 8 RD8 Caterpillar tractors
- 3 Wood road-mixers (2 on base, 1 on top courses)
- 4 Rubber-tired aerators (rollers)
(More were needed, should be two per mixer)
- 4 Case tractors (rubber-tired)
- 8 Autopatrols for finegrading and blading of windrowed material

be a menace to asphalt. The job also involved about 500,000 cu. yd. of grading. Excavated material was all used in fill, compacted with sheepfoot rollers to maximum density with optimum moisture content. Grading included also an extensive storm drain system involving \$250,000 outlay for perforated corrugated pipe drains of 18- to 36-in. diameters and concrete mains of 42-in. diameter. Methods of placing the two-course paving by the road-mix method are described in the following.

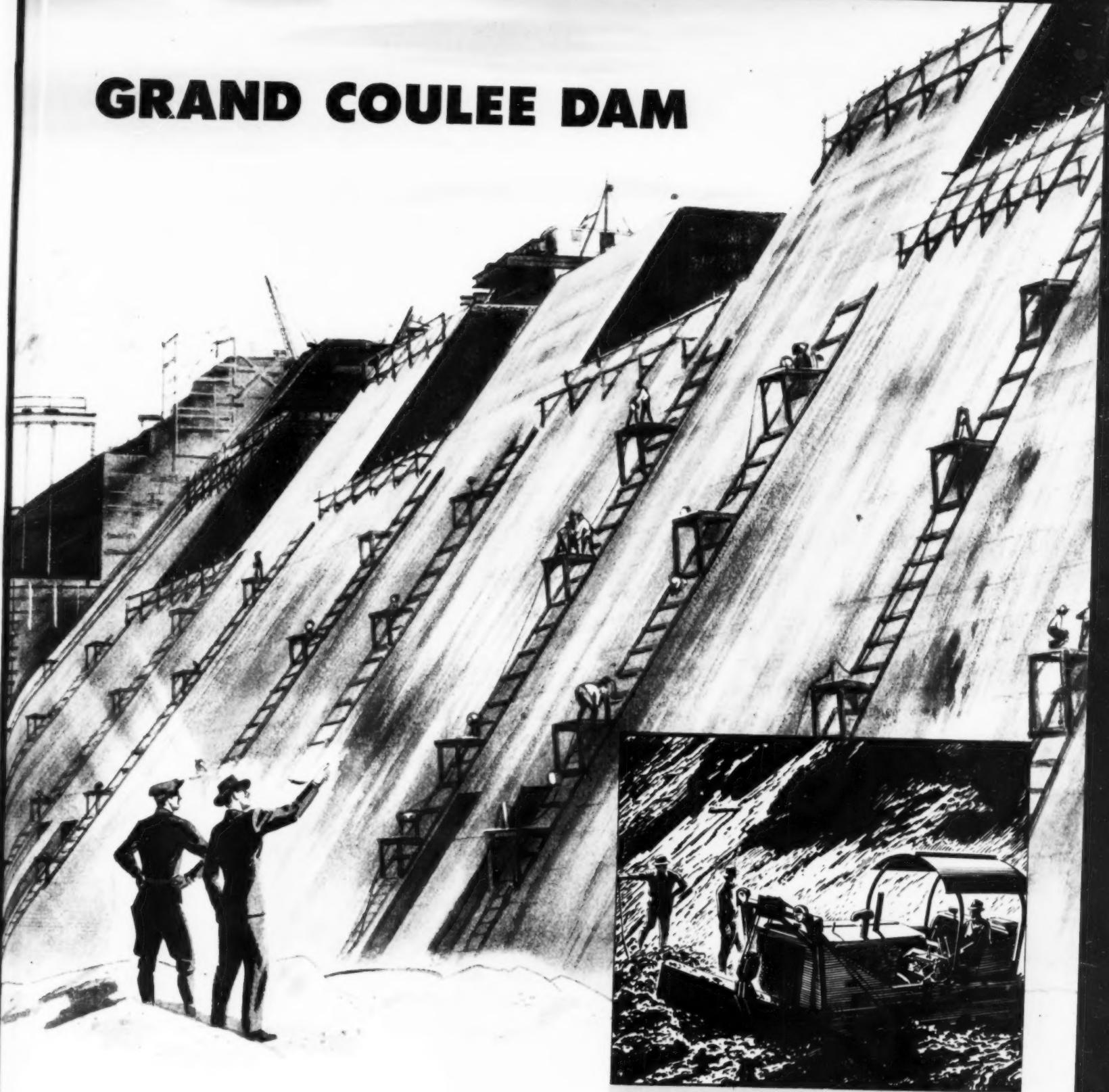
Road-Mix Methods

On completion of the rough grading operation, which was considered to be sufficiently accurate if within 0.2 ft. of the specified grade, auto patrols with specially selected operators began the fine grading operation. This was given careful attention because in this operation the accuracy of the finished surfacing is largely predetermined by the accuracy of surface grading prior to the proportioning of the material in windrows. The fine grading operations are expected to bring the surface to exactly the prescribed level at control points with a maximum tolerance of $\frac{1}{2}$ in. off grade at any intermediate point.

On completion of the finegrading, the material to be used in the base course is considered to be exactly spread. Subsequent operations are merely such movement of this material as is incidental to the proper admixture of oil and compaction of the resultant mix solidly in place. In other words, subsequent operations may move the material to the left

(Continued on page 100)

GRAND COULEE DAM



One of hundreds of important construction jobs where Shell Diesel Lubricants helped keep equipment operating at peak efficiency 24 hours a day.

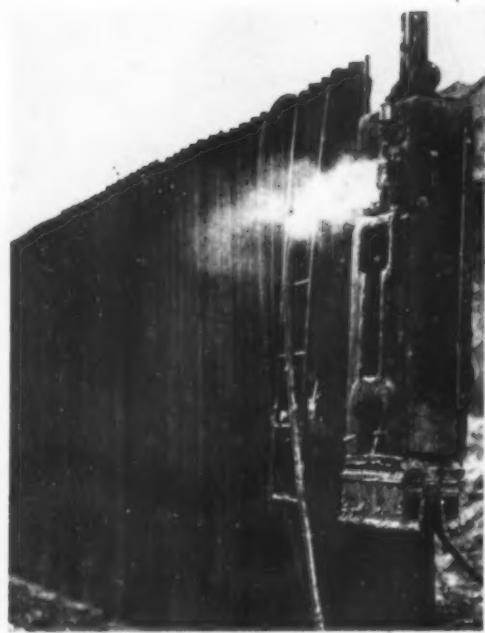
Let us show you how Shell can fill *your* Diesel needs.

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SHELL
DIESEL
LUBRICANTS

For Heavy Duty



THIS SHEETING SAVED STEEL . . . FOR 22 TANKS



Sometimes metal sheeting is a military *must* on vital war projects.

Just such a job recently required 37,000 square feet of steel sheeting. Figured with ordinary hot rolled sheeting, approximately 534 tons of metal would have been used. Doing the work with sturdy, light-weight ARMCO Sheetings required only 179 tons—a saving of 355 tons of precious steel, or enough to build 22 light tanks.

ARMCO Sheetings also saves time and labor. A smooth surface and small displacement permit fast, easy driving. On temporary jobs it can readily be pulled and used over and over again. Lengthwise corrugations provide ample strength, also make the sheeting nestable, simplifying storage and shipping.

You can save time and metal by ordering ARMCO Sheetings in the exact gage and type you need. Interlocking, Flange and Clip-types are supplied in 8, 10 and 12 gage, in 12 and 14-inch widths, and in standard lengths up to 18 feet. Write for help on unusual applications. Armco Drainage Products Assn., 105 Curtis Street, Middletown, Ohio.



ARMCO SHEETING

(Continued from page 98)
or right, or pile it up in windrows, but are not expected to change, even in slight degree, the quantity of material spread on each square foot of runway surface.

The next operation is to scarify to within $\frac{1}{2}$ in. of subgrade, which is 6 in. below the finegraded surface. Then the windrow proportioner (which is a spreader box with a fixed orifice at the rear, mounted upon an auto patrol in place of the standard mold board) shapes up a windrow containing a predetermined amount of material per lineal foot. This proportioner frequently is passed over a windrow three times to get the quantity just right. On this job runway widths were such that for the 6-in. depth of base it was most advantageous to space the windrows 7 ft. 4 in. apart, center to center. In the material windrowed on this job an allowance of one-third was made for the increase in volume between that of the compacted material and the scarified material. In other words, for a base course 6 in. deep, a windrow of 5 cu. ft. per lin. ft. of scarified material was used for a strip of runway 7 ft. 4 in. wide. This gives a slight margin above the actual requirements, thus making sure of meeting specifications as to finished depth after materials are again compacted.

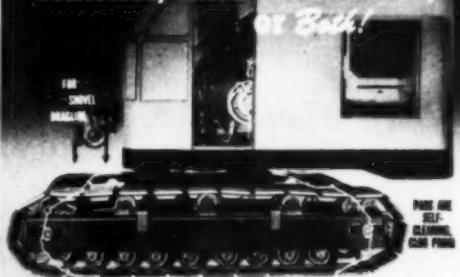
Care in the spacing of windrows and in measurement of material they contained was all important, the contractor said, in assuring the accuracy of the finished job. Thereafter, it only remained to mix in the oil with the mixers, aerate with the blades and roll.

Road-Mixer Train

In the first of these operations the road-mixer train, towed by a tractor, is geared to travel at 18 ft. per min. (2.4 m.p.h.). A special transmission on the rear end of the tractor makes it necessary to use only a small part of the power for tractive effort while most of the power goes into operation of the mixing paddles in the mixing machine proper. Even in heavy pulling, with a full complement of equipment, not more than 15 percent of the 110 hp. of the tractor goes into tractive effort in advancing the train. The train usually included the tractor, road-mixing machine, a 3,000-gal. water storage tank towed behind and a 6,000-gal. oil truck and trailer tank unit from which a constant flow of emulsified asphalt was drawn.

The water truck was usually towed alongside, instead of in, the train to simplify replacement of newly filled units. A shorter haul usually is involved in water delivery and tank trucks with water can be moved up to position alongside and coupled on there with a minimum of delay. Be-

for Soft Ground, for Stability,
specify BYERS extra long
crawlers, extra wide treads,

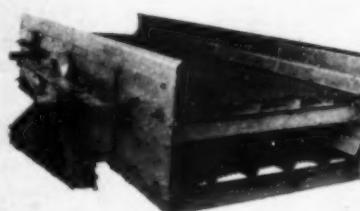


For long boom work at wide radii or for soft ground travel, you may need special crawlers to provide additional stability or extra light ground bearing pressures.

The variety of tread widths and crawler lengths available on Byers cranes and draglines will permit you to order a machine more nearly tailor made to meet your job requirements.

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The first few pages of ROBINS new X-Ray Bulletin No. 115 are printed on separate transparent sheets and show the various important parts of the well-known ROBINS-GYREX Vibrating Screen. Together these pages make up a complete screen; but taken separately they permit the reader to study each element of construction and design independently of the rest.

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cause of the longer oil haul, it was found economical to use an oil trailer of about twice the watertank capacity. On this job the 6,000 gal. of emulsified asphalt ordinarily would be used up in a 1½- to 2-hr. run. When one tank was exhausted, the replacement tank was expected to be close at hand ready to be coupled on.

The 18-ft.-per-minute travel of the road-mixer, allowing for the usual change requirements, netted about 1,000 ft. per hr. or, say, an average of 900 ft. per hr. through a 7½-hr. shift. With two mixers it was usually possible to complete a 45-ft. width of runway for a length of 5,000 ft. in a 2-shift (15-hr.) day. Progress at top speed on this job meant passing about 300 tons per hr. through each road-mixer. Of this total 17 or 18 tons was emulsified asphalt and about the same quantity was water. The road-mixer crew included one tractor operator, one mixer operator and two laborers who helped as required. There were also, of course, drivers of trucks supplying water and emulsified asphalt.

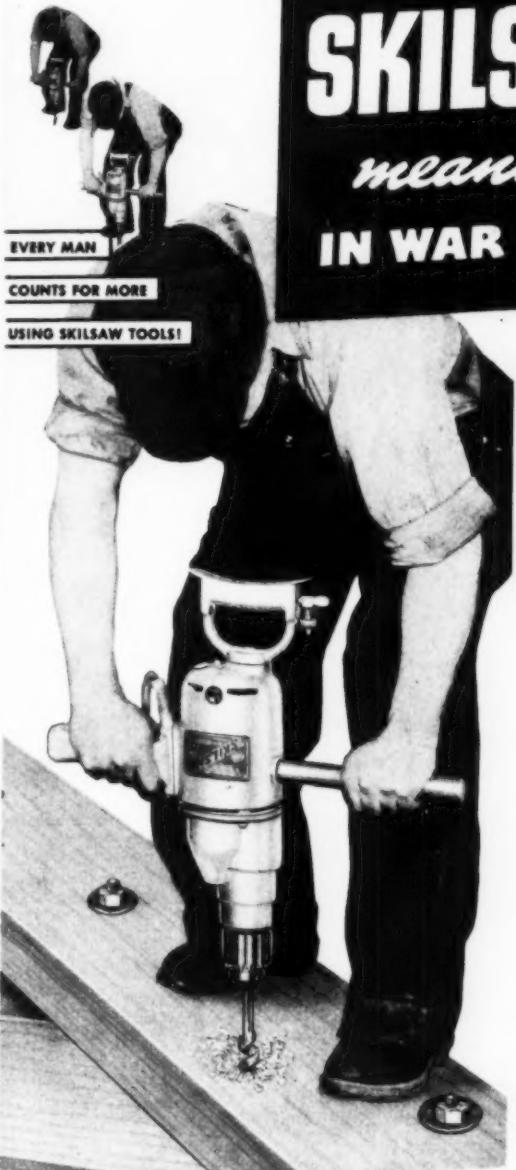
On this job frequent determinations of moisture content of material in the windrow made it possible to adjust the amount of water added ahead of the emulsified asphalt to get just the desirable moisture proportions in the admixture.

Preparing the Mix

As the paddles of the road-mixer agitated the material, two jets were applied: the first jet was a water stream which moistened the material and brought it to the desired plasticity preparatory to the application of the jet of emulsified asphalt that immediately followed. Accurate control of the proportions in these two jets constituted the regulation by which the optimum oil admixture was obtained. Since no flow meter has been found that will satisfactorily measure emulsified asphalt, the desired rate of flow was maintained by controlled pressure on a fixed orifice. When thus equipped, all delivery truck and trailer tanks were calibrated and checked by measuring the tank contents at measured points along the line of travel. In other words, both the emulsified asphalt and the water were delivered under accurately controlled pressure heads developed by pumping.

A single passage of the road-mixer left the windrow with a thoroughly admixed oil content and thus material for the base course was ready for spreading. The old method was to spread this into a 6-in. thickness and then to compact this entire depth all at once. That method has

(Continued on page 102)



EVERY MAN COUNTS FOR MORE USING SKILSAW TOOLS!

The Extra Power in SKILSAW DRILLS means Extra Speed IN WAR CONSTRUCTION!

Wherever SKILSAW DRILLS are on the job, cantonments go up quicker, housing projects are finished faster, war plants are ready for production sooner. Here's the reason: with their greater drilling power SKILSAW DRILLS drive more holes per hour . . . punch holes in drilling bottlenecks . . . get more work done with fewer men.

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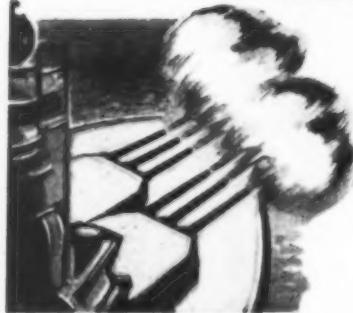
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ENDURANCE

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IN battle, dogged endurance is essential to victory. In excavating, too, a bucket must not only dig, but continue to dig efficiently under every conceivable condition, for long periods of time. Experience has built into Owen Buckets materials, original features and design factors that assure enduring performance that is unequalled.

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**\$11.52 a mile
saved . . .**

WHEN DIGGER TEETH WERE HARD-FACED WITH COAST METALS

WHEN one mid-western construction company changed to Coast Metals for hard-facing the teeth of its digger bucket, it reported several noteworthy economies. The teeth showed greater wear-resistance. So much so that re-facing was necessary only every six miles instead of every three miles as formerly required. This saving amounted to \$11.52 a mile.

On another job, Coast Metals Hard-Faced digger teeth gave over 12 weeks' service where 3 weeks previously had been the limit. On still a third job, Coast Metals teeth excavated 130,000 feet in sandy soil before re-facing was again needed.

By making dipper teeth, grader blades, rolls and hammers in crushing equipment, tamps on sheepfoot rollers and other parts exceptionally resistant to abrasion, impact and wear, Coast Metals Hard-Facing lengthens equipment life several times. It is readily

applied by the acetylene welding torch or electric arc to any ferrous metal. Write us for the correct rod to solve your problem.

COAST METALS, INC.
Plant and General Offices: Canton, Ohio
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**COAST
METALS**
**hard-facing
weld rods**

YOUR EQUIPMENT'S LIFE PRESERVER AGAINST WEAR

(Continued from page 101)

been abandoned because too much time is required for adequately drying-out a layer as thick as 6 in. Present day practice is to spread the windrowed material into 2-in. layers and to work thoroughly each successive layer with pneumatic-tired rollers whose action both compacts and aids in drying out.

Accordingly, on this job a 25-ft. width was worked at one time by moving aside three windrows with the auto patrols, taking the material from 1½ windrows on each side and piling it over other windrows until it could be bladed back into place. From the windrows thus temporarily piled up on either side, the material was bladed over the 25-ft. strip to form the successive 2-in. layers which were separately rolled.

This compacting process cannot be completed until the material is sufficiently dry and stable to carry the load imposed by the next layer. More specifically, a moisture content of not more than 5 percent should obtain in any layer when the next layer comes on. Subsequently, still more moisture should escape from the layers until moisture content in the whole 6-in. base has dropped to about 2 or 3 percent. When this stage is reached, a RC-3 tack coat is applied and the base is ready for the 2-in. top.

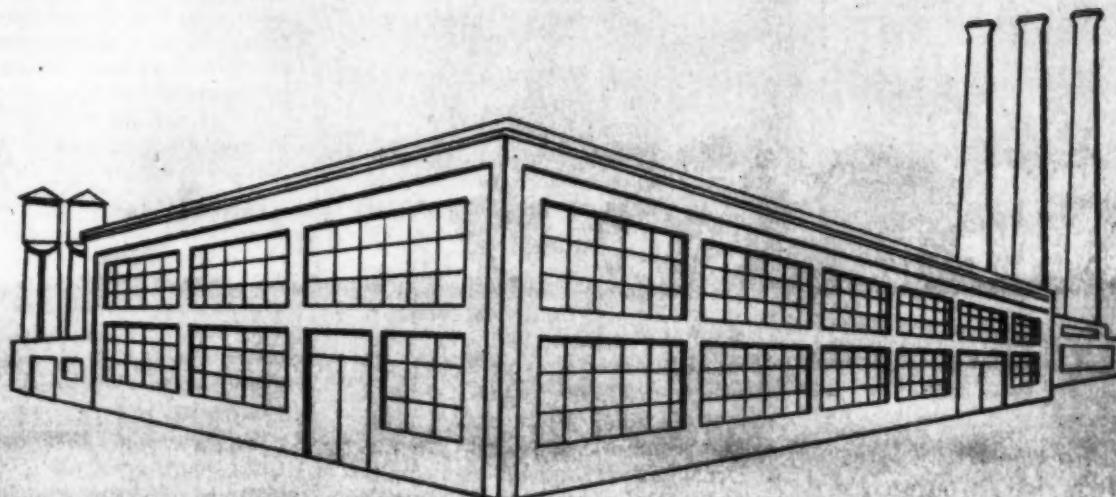
Must Dissipate Volatile Solvents

A notable difference between methods and requirements in "hot mix" and emulsified asphalt jobs was emphasized by the contractor on this job. In handling hot asphalt, he said, the requirement is to work the material before the temperature (which here serves as a solvent) has fallen below the working point. With a liquid solvent (either water or still more volatile material, such as naptha) a very different requirement governs, namely, the surface layer must be worked in such a way as to dissipate the volatile solvents and care must be taken not to seal them into the material. Failure to observe this requirement, the contractor pointed out, has caused many of the failures that have occurred in paving of this type.

This requirement about working out the solvent dictates application of the base course in layers not more than 2-in. thick and placement of the 2-in. top (on this job consisting of rapid curing asphalt which contains naptha) in layers of $\frac{1}{2}$ - to $\frac{3}{4}$ -in. thickness. Aeration and compaction of each layer with pneumatic rollers is intended to dissipate the volatile

(Continued on page 104)

FINISHED BY THE FIRST?



Preview of war plant which must be built in a rush. How time can be saved by building it with Atlas High-Early cement

AN empty lot today—and after not too many tomorrow it will be another unit on the war production front. And in keeping vital war construction on the double-quick, Atlas High-Early cement has proved that it has an essential part to play. Why?

Because Atlas High-Early cement speeds completion of concrete work in these three distinct ways:

1. Concrete may be used sooner because Atlas High-Early cement gains strength rapidly—produces usable concrete quickly. On some jobs contractors have reported that they have put the concrete in service in one day, whereas

it would have been necessary to wait three to five days with standard portland cement. Thus men and machines are released for new work more quickly.

- 2.** Time for protection and curing is cut to the bone... cut as much as 70%. This feature is particularly important in cold weather construction.
- 3.** Forms may be stripped more quickly, often in 24 hours instead of three to five days. Thus fewer forms may be necessary—saving time, labor and lumber.

Many architects, engineers and contractors, faced with a rush construction job, have found that Atlas High-

Early cement can be relied upon for quick war production—construction of factories, military highways, airport runways, floors or foundations.

Whatever your job may be, consider Atlas High-Early cement. It will help you save time, cut costs, and finish work faster. Universal Atlas Cement Company (United States Steel Corporation Subsidiary), Chrysler Building, New York City.

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SAVE TIME IN WARTIME WITH ATLAS HIGH-EARLY CEMENT

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PRODUCTION METHOD

— of forming
Concrete Piers
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SONOTUBE
Faster
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The new Laminated
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5 STANDARD SIZES

9	10	11 1/4	12	13 1/2	Inside Diam.
64	78.54	100	113.1	144	Sq. Inches

Immediate Delivery



CUT

Sonotubes arrive on job up to 24 ft. long—light, easy to handle—placed in cradle and cut with hand saw to proper lengths. (Laminated fibre easy to cut.)



SET

Placed in position and aligned on footings. Minimum bracing for tall piers (up to 10 ft.) Backfilling sufficient for short piers.



POURED

Sill braces set, and troweled off—piers are soon ready for sills. No stripping is necessary. Wax treated forms will slough off in time.

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SONOCO PRODUCTS COMPANY

HARTSVILLE, S. C. MYSTIC, CONN.
ROCKINGHAM, N. C. GARWOOD, N. J. LOWELL, MASS.

(Continued from page 102)
solvents and to compact and harden the material to the desirable toughness. Weather conditions affect this requirement; on this job three layers to the 2-in. top was found to be about right.

It was found possible to deliver material for the 2-in. surfacing coat in accurately proportioned windrows before the tack coat was put on. This was done by putting on the tack coat between that pair of windrows lying in the center of the strip to be worked, then putting the road-mixer over the windrows and afterward blading the windrowed material in successive layers over the 25-ft. strip just given the tack coat. Similarly, adjacent strips were surfaced until the entire width of the strip had been completed. This method was said to give the tack coat just the proper amount of time to dry before the top surfacing went on.

After the top coating had been adequately rolled, a final seal coat of quick-setting asphalt emulsion was put on at the rate of $\frac{1}{8}$ to $\frac{1}{4}$ gal. per sq. yd. Over this sand was spread at the rate of 8 to 15 lb. per sq. yd. After being broomed and rolled, surplus sand that did not adhere was finally swept off. It is found that about 8 lb. of the sand per sq. yd. had remained bonded to the seal coat.

Three Oils Used

The three "oils" used on this job included (a) the mixing emulsion, the emulsified asphalt put into the base course which contained about 40 percent by volume of water put in at the emulsifying plant, (b) RC-3 or rapid curing asphalt used for the 2-in. top course and (c) a quick-setting emulsion or "tack coat" used as bond between base and top coats and also for the final seal coat.

A feature of this job was the "victory watertank" design used for the tanks delivering water to the road-mixer. Truck tanks were made by welding up into tank form on a suitable truck bed, steel form sections that had once been used on a concrete pumping plant and thereafter had been stored in the contractor's equipment yard. Truck tanks of capacities ranging from 1,500 to 3,600 gal. made by this method gave very satisfactory service.

A portable emulsifying plant was set up for this job at a refinery within a 15-mi. motor-truck haul of the job. This plant, which was designed to convert 400 tons daily of grade D asphalt into the required emulsified mixture, was usually overloaded to the 420-ton per day output used on this job. The plant saved the need for 70 tank cars that otherwise would

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Every maintenance man should have this fact-filled, 24-page data manual! Tells how to safely de-scale water-cooled air compressors, gasoline engine cooling systems, oil coolers, etc. Also describes effort-saving rust removal methods. Your copy is FREE . . . write today!



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have been required for delivering the emulsion from the more distant refineries where it is ordinarily produced.

Paving at this airport was under contract to Clyde W. Wood Co., Inc. A. F. Weesner was superintendent and Frank C. Wood, assistant superintendent. The work was carried out under the supervision of the U. S. Engineer Department.

★ ★ ★

Panama Roads and Bridges

(Continued from page 47)

projected originally as a section of the Inter-American Highway. Chorrera is 25 mi. from Panama City to which it is connected by an existing road. The new road extends 52 mi. to an important military airfield. Construction was begun in cooperation with the Republic of Panama under direction of Public Roads engineers. At the outbreak of war it became imperative that the road be completed in the shortest possible time. About half of the 52 mi. had been surfaced. The United States agreed to complete the work without cost to Panama; all available machinery was concentrated on the job, and surfacing was completed on July 1.

The two projects involved 76 mi. of concrete pavement, 42 bridges and exceptionally heavy grading. Work is now under way on a new road to replace the existing road between Madden Dam and Panama City.

Chagres River Bridge

Traffic on the Trans-Isthmian highway crosses the Chagres River by way of a narrow roadway on top of Madden Dam. This potential bottleneck is being eliminated by the construction at a site about 1 mi. below the dam of a bridge consisting of two 200-ft. continuous-deck truss spans. Plans for a 4-lane divided roadway and restricted clearance above high-water made it desirable to use three trusses instead of the usual two. The approaches are continuous I-beam deck spans.

The piers are founded on rock or on steel piles driven to rock. The rock formation is very irregular, requiring in some instances piles under one footing of a bent while the other footing rest on rock.



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When you Specify SCHRAMM Compressors

Design in Construction makes these Compressors the "Light-weight Champions" of the World



Without sacrificing an ounce of pressure or a day of hard-hitting useful life Schramm gives you a compressor with a weight saving up to 40% . . . Take a look at the straight-in-line vertical cylinders, cast en-block — a compact arrangement that makes for streamlining and releases critical materials which are so badly needed in our present crisis. So, for any job that requires compressed air — Drilling, Concrete Breaking, Tamping, Demolition, Trench Digging, Pile Driving, Riveting, etc., specify Schramm. Write Today for Our Interesting Portable and Stationary Compressor Catalogs — They're FREE.

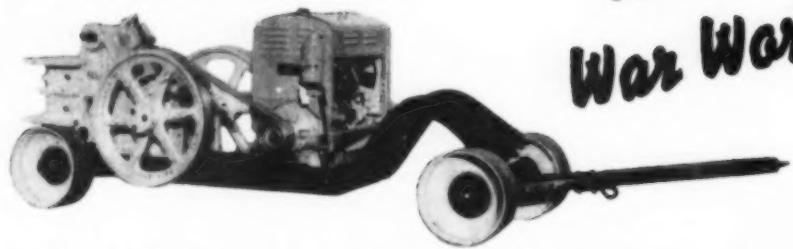
PORTABLE • STATIONARY... DIESEL • GASOLINE • ELECTRIC... 20 TO 420 CU.FT.

SCHRAMM, INC.

WEST CHESTER, PA.
DEALERS IN PRINCIPAL CITIES

Reliance

will speed
that
War Work!



PORABLE CRUSHING UNIT with V-BELT DRIVE

More
CRUSHING with
least
EFFORT and POWER
plus
RUGGED DURABILITY

This speedy Reliance Portable Unit can be used with *equal profit* — 1st — as a Crusher alone, or — 2nd — in combination with Elevator, Chute, Screen, etc. Note the *low feed opening* at a *safe distance* from the balance wheels. Note the reliable *power-producing V-Belt Drive*. Note the *low center of gravity* for stability. For strength, simplicity and economy you can't beat this or any other *Reliance*.

● OTHER PRODUCTS — Reliance offers a complete line of Rock Crushers; Bucket Elevators; Revolving Screens; Storage Bins; Pulverizers; Chip Spreaders; Heating Kettles, Bin Gates; Feeders; Belt Conveyors; Grizzlies; Air Separators; Sand and Gravel Spreaders; Wash Boxes.

UNIVERSAL ROAD MACHINERY CO.

Kingston, N. Y., U. S. A.

DISTRIBUTORS IN ALL PRINCIPAL CITIES OF U. S. A.

Speed and
Steel Saving

Mark Construction of
Detroit Expressway

(Continued from page 55)
through the Public Roads Administration with the support of the War Department, and contracts carried an A-1E preference rating.

Including nearly \$1,500,000 for right-of-way, the 11-mi. section cost more than \$6,500,000. The state supplied the right-of-way and paid 25 percent of the construction cost. Funds for the remaining 75 percent of construction cost come out of the \$150,000,000 federal appropriation for access roads authorized by the 1941 Defense Highway Act. An accompanying table gives a breakdown of costs for the project.

Construction of the 11-mi. section of the expressway followed closely upon completion of an elaborate system of access roads which were built during the fall, winter and spring to serve great war plants to the west of Detroit. These plants draw scores of thousands of workers from the urban area. A new limited-access four-lane divided highway extends eastward from the access system to a connection with the newly opened section of the Detroit Industrial Expressway. For the present, the expressway terminates at this point; eventually it will be extended west and south in the direction of Chicago, 250 mi. distant. At its eastern terminus, the 11-mi. section makes connection with a suburban north-south highway which will function temporarily as the distributor and feeder for expressway traffic into and out of the city.

Preparations have been made to start construction at an early date on several grade separations for an adjacent 5½-mi. section which will carry the expressway to a point inside the city limits. Beyond the latter section, construction of the city portion of the expressway as a crosstown freeway on an elevated structure will have to await a time when steel again becomes available.

On the sections now completed or scheduled for early construction, widths of both right-of-way and pavement conform to the highest stand-

(Continued on page 108)

*Serving
the "FACTORY FRONT" too!
in Moving*

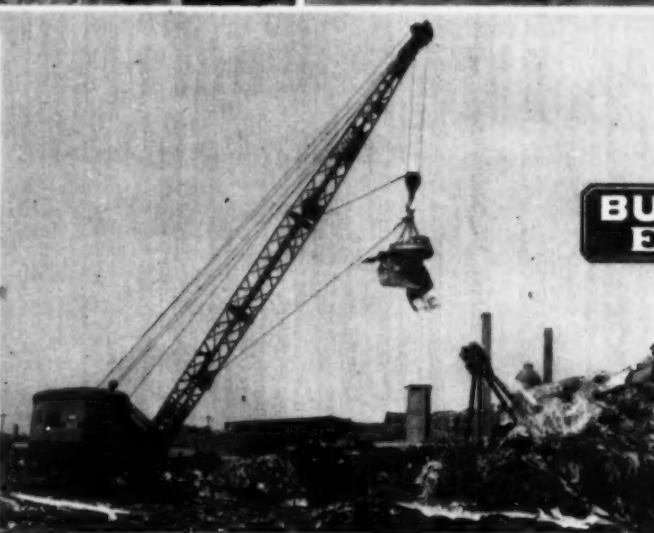
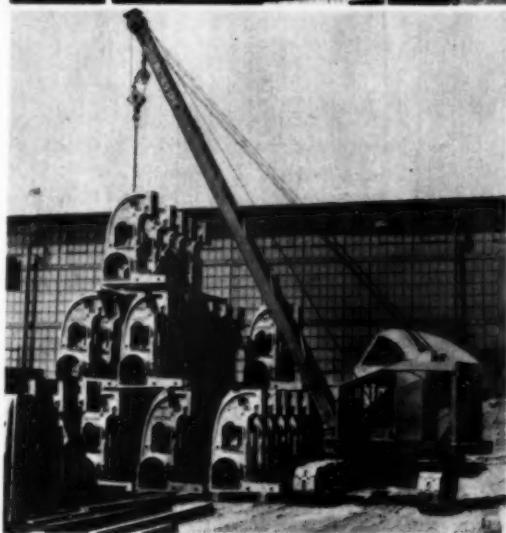
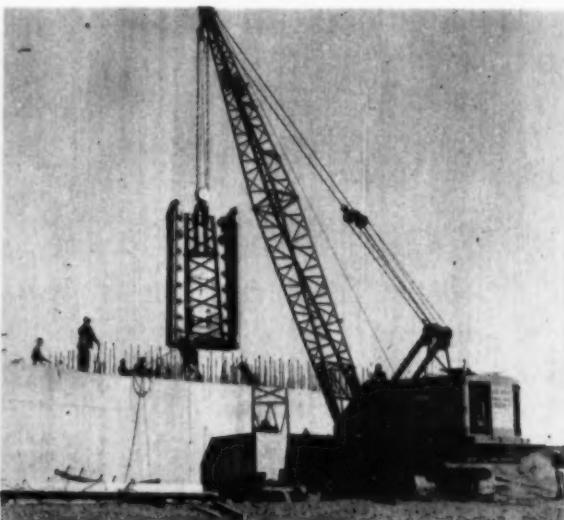


ROGERS
LOW BED-
-HEAVY DUTY
TRAILERS

ROGERS BROTHERS CORP., ALBION, PENNA.

Wartime construction puts heavy demands on crawler cranes. Here are a few suggestions that may help you keep your rig going at top speed for the duration:

Make your CRANE Last longer



**BUCYRUS
ERIE**

- 1 Keep surface of drum well lubricated for smooth rope spooling.
- 2 Keep brakes and clutches in good adjustment.
- 3 Inspect the entire machine regularly and remedy any troubles while they're still small. Remember to inspect sheaves, watching grooves, guards and lubrication.
- 4 Follow manufacturer's recommendations for lubrication.
- 5 If there are long waits between lifts or moves, shut off engine, never let it idle for long periods.

- 6 Use proper rope length for each job. A too-long rope means excessive overwinding and that increases wear greatly. Rope life can often be increased by reversing ropes end for end.
- 7 Keep close watch for frayed or damaged cables.
- 8 If boom hoist operation is not necessary on particular job, it should be tried and adjusted at regular intervals.
- 9 Call on your distributor for help with special service or maintenance problems.

ARMY
NAVY
B
Bucyrus-Erie employees
have accepted the award
of the Army-Navy "E"
as a challenge to keep
production rising. *

SOUTH MILWAUKEE • WISCONSIN • U.S.A.

Bucyrus-Erie

*We'll be making them
even better when
the shootin' stops*



AMERICAN GENERAL PURPOSE HOISTS

1 TO 5 TONS CAPACITY . . . 5 MODELS

The one-drum hoist can be expanded for more complex work by adding one or two drums and a slewing attachment. Bed and side frames are built up of welded steel shapes; obtaining maximum strength without any excess weight. Easy to operate; easy to keep in first-class running condition. We'll be making them even better when the shootin' stops.

For months all our facilities have been engaged in supplying Uncle Sam with the tools of war and it has been impossible to take care of the normal equipment requirements of old friends who have been loyal to us for years.

Most machinery manufacturers and their customers are in the same boat. But we do have one outstanding advantage. We did not have to re-tool or make our plant over to take over the war work that was delegated to us. We are building equipment so closely related to our regular output that it was not necessary to re-tool or change over our machines. However to meet requirements we have installed many new machines and facilities which will enable us to give better service to our regular customers when peace returns.

Meanwhile we will do everything possible to help you keep your present AMERICAN equipment running in first-class order.



(Continued from page 106)
ards for divided highways. Right-of-way has a normal width of 300 ft., which increases to as much as 1,300 ft. at interchange locations. In the relatively flat country traversed by the expressway, the 300-ft. width allows a 140-ft. distance between inner edges



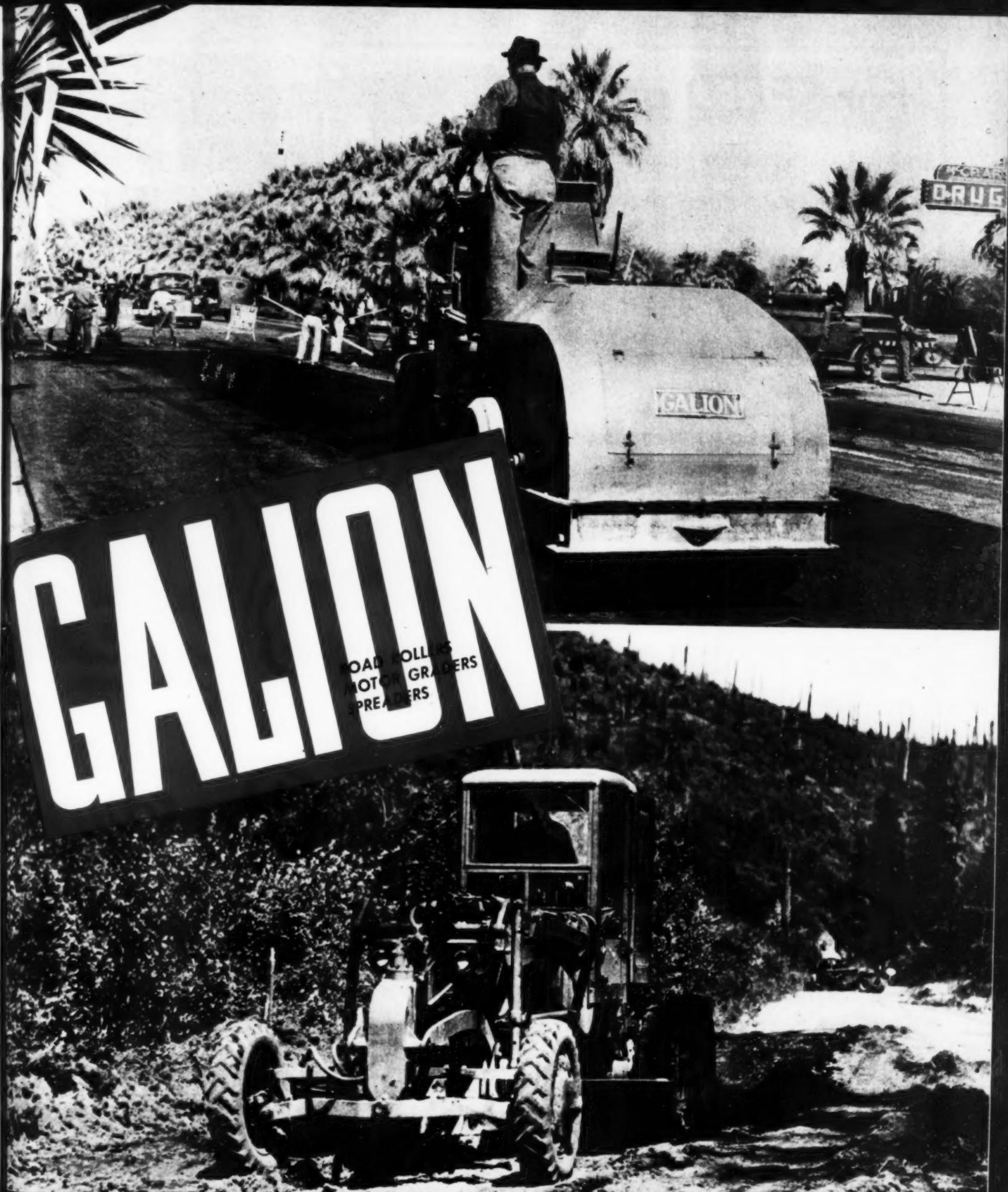
TO UNLOAD this bulk-cement truck, driver installs auxiliary shaft which turns unloading screws through connection to power takeoff of truck engine.

of the two 24-ft. pavements. The pavement slabs are flanked by 12-ft. shoulders, both on the grade and on bridges. Between the roadways, drainage is collected in a shallow center ditch with 1-on-6 side slopes. Similar flat slopes are used for the outer side slopes and back slopes of the highway.

Contractors' Operations

To complete the first section of the expressway, the contractors handled 2,600,000 yd. of excavation, 30,000 yd. of concrete for bridges, and 440,000 sq.yd. of concrete pavement. For most of the 11-mi. section, the pavement is laid on embankments about 4 ft. high. On the west half of the project, the embankment consists entirely of excellent sand-gravel material excavated both from grade-separation cuts and from borrow pits. On the east half of the section, excavation for grade separations struck a soft blue clay at an average depth of about 5 ft. below the surface, and this clay was placed in the lower lifts of the embankments, which were compacted in layers by sheepfoot tamping rollers. The clay fill was covered by a cushion 2 ft. thick of pervious sand-gravel material obtained from borrow pits. Because of an exceptionally wet season, much of the clay had to be wasted; moisture content of the material was far above

(Continued on page 110)



THE GALION IRON WORKS & MFG. CO.

Main Office and Works GALION, OHIO

For SPEED and SAFETY...



LOWELL Reversible Ratchet WRENCHES



You gain speed through the easy handling, strong leverage and straight-line application of power on LOWELL REVERSIBLE RATCHET WRENCHES.

The improved new types of LOWELL WRENCHES are the result of more than 70 years experience and development - 1869 to 1942. They are made in a wide range of types and sizes for all classes of heavy construction, erection and maintenance.

Have patience with your dealer if he is unable to furnish all of the numerous LOWELL types and sizes, for we are engaged, for the duration, in supplying the needs of our Armed Forces.

LOWELL WRENCH CO.

1869

WORCESTER, MASS., U.S.A.

1943

See how each pawl, when engaged, transmits leverage from the solid stock of the handle direct to the gear, in a straight line and with a square contact. The pawl is in COMPRESSION ONLY - no shear, no tension, no torsion. The shipper carries NONE of the load. This strong construction insures steady service.

(Continued from page 108)
optimum, and the weather was unsuitable for drying.

Close collaboration of the contractors, with the willing approval of the highway department, expedited completion of the project, particularly of the grading-and-paving contracts. It was common practice for a contractor on one of the grading-and-paving sections to subcontract either the grading or the paving on his section to another contractor who had the equipment and organization available to perform the work. This procedure enabled expressway contractors to extend their operations on the project and to keep continuously employed men and equipment which otherwise might have been shipped out to an-

DETROIT INDUSTRIAL EXPRESSWAY Section 2

COST SUMMARY

Road contracts	\$3,114,431.89
Structure contracts	1,673,283.44
Pump house contracts	249,281.99
Watermain relocation	30,000.00
Right-of-way	1,491,471.24
Total Cost	\$6,588,468.56

CONSTRUCTION QUANTITIES

Earth excavation	2,599,250 cu.yd
Concrete pavement, 9-in. uniform	440,000 sq.yd
Concrete in structures	29,360 cu.yd

PROJECT DATA FOR AVERAGE WEEK (Week Ending Oct. 7, 1942)

Earth excavation	124,717 cu.yd
Concrete pavement, 9-in. uniform	28,980 sq.yd
Skilled men employed	275
Unskilled men	555

MAJOR EQUIPMENT UNITS

Trucks	251
Draglines and shovels ($\frac{3}{4}$ to $1\frac{1}{2}$ cu.yd.)	41
Tractor-scrapers (15 cu.yd.)	9
Paving mixers (34E dual and 27E)	5
Truck mixers	30

other job. An accompanying table lists the principal equipment and the working force employed on expressway construction during an average week.

Contract Prices

Grading and paving contracts for the expressway and, for interesting roads were set up under separate sections to allow for variation in unit prices on items such as excavation, which differed widely for the two kinds of jobs, but contiguous contracts for an expressway section and an intersecting road always were bid in combination. Thus it happened that, of the six contractors holding the total of twelve contracts for grad-

(Continued on page 112)



CLEVELAND CARTOONS

tell how to
keep rock drills
on the Job

IT'S FREE
write for
a copy



A TYPICAL CLEVELAND CARTOON

DON'T USE DULL DRILL STEELS — When the bit, from wear or improper sharpening, loses its gauge, it will no longer be free in the hole and the blows of the hammer wedge it tightly, greatly slowing up, if not entirely stopping the progress of the drill. Never use dull steel. You get no drilling to speak of, and you put your machine in the repair shop besides.

BRANCH OFFICES

Birmingham, Ala.	Chicago, Ill.	Lexington, Ky.	Richmond, Va.
Berkeley, Calif.	Cincinnati, Ohio	Los Angeles, Calif.	Salt Lake City, Utah
Boston, Mass.	Dallas, Texas	Milwaukee, Wis.	St. Louis, Mo.
Buffalo, N. Y.	Detroit, Mich.	New York, N. Y.	Victor, Colo.
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	Ironwood, Mich.	Pittsburgh, Pa.	Washington, D. C.

CANADIAN DISTRIBUTORS

Purves E. Ritchie & Son, Ltd., 658 Hornby Street, Vancouver, B. C.
Whitehall Machine & Tools, Ltd., Galt, Ontario

BUY U. S. WAR BONDS AND STAMPS

The CLEVELAND ROCK DRILL CO.

Subsidiary of The Cleveland Pneumatic Tool Company

CABLE ADDRESS: "ROCKDRILL"

CLEVELAND, OHIO

LEADERS IN DRILLING EQUIPMENT

THE PUMP THAT *Stays on the job!*



ON the really tough pumping jobs where dirt, sand and grit take rapid toll of ordinary pumps, rugged CARVER centrifugals are setting records for consistent high performance. Long, trouble-free service is a job-tested fact about CARVER pumps that will mean dollars and hours saved on your job, for these outstanding centrifugals maintain their lightning-fast prime, their extremely high efficiency, even after thousands of hours of pumping.

For a pump that starts out ahead and stays ahead—specify CARVER on your job!

Gas engine, electric motor or belt-driven CARVER centrifugals are built in capacities from 5,000 to 125,000 G.P.H.

Get the facts about these efficient, long-lived pumping units—write NOW for your copy of the CARVER pump catalog.

CARVER PUMP CO., Muscatine, Iowa

**CARVER CENTRIFUGAL
Certified PUMPS**

(Continued from page 110)

ing and paving on the expressway, five firms under their combination bids also handled the grading and paving for eight intersecting roads, where the excavation from cuts for grade separations was transferred into expressway embankments. Values of these grading and paving contracts ranged from about \$130,000 to \$550,000. One contract, the longest on the project, called for 3 mi. of straight grading, drainage and paving in a section without any grade separation on the sandy west half; this contract amounted to \$377,000.

Unit prices bid on grading and paving contracts revealed an upward trend between May and September. The 3-mi. contract, signed on May 7, carried unit prices of 25c. per cu.yd. for borrow and ditch excavation and \$2.36 per sq. yd. for concrete pavement of 9-in. uniform thickness. Seven weeks later, when the same contractor again was low bidder for a job one-third the value of the other, his prices were 45c. for borrow and ditch excavation and \$2.75 per sq.yd. for pavement. These latter prices were duplicated by another contractor who was low on the final paving contract, for which bids were taken Aug. 12, with actual signing of the contract taking place later, on Aug. 27, after concurrence had been obtained from Washington.

Excavating Equipment

Borrow material for highway embankments was obtained from numerous borrow areas and was hauled for distances of 1 to 5 mi. Excavating equipment operating at any one time in a borrow pit ranged all the way from a pair of draglines or a power shovel to a group of five or six draglines supplemented by two shovels. The draglines were of 1-yd. to 2-yd. capacity, and the smaller number of power shovels were of $\frac{3}{4}$ -yd. to $1\frac{1}{2}$ -yd. size. At the maximum, about fifteen machines were digging in the borrow pits. All the borrow material was hauled by truck, with as many as 180 trucks operating from one pit. To as great an extent as practicable, the borrow material was taken out of small hills and hummocks without digging below the high water table, only 3 or 4 ft. below the level of the surrounding fields. On the westerly 5 mi., however, most of the borrow was obtained from wet pits which required damming, pumping, and excavation below water level by use of draglines.

Excavation for grade-separation cuts was taken out by tractor-scraper units so long as the material was sand-gravel which could be dug readily by these outfits. This method of excavation was feasible at two in-

(Continued on page 114)



—Official U. S. Navy Photograph

★ **I**n fulfilling its destiny, steel wire rope is now called upon to withstand the wear, tear, stress and strain of war time production. Its fields of service are the "hot spots" of industry. Shipyards, oil fields, mines, mills, steel plants, construction jobs . . . are a few of its important battle stations.

While wire rope is designed for hard work, its actual life span is definitely influenced by the way in which it is handled, as well as by the condition of the equipment on which it is used.

Kinks, reverse bends, corrugated sheaves, improper fleet angle, incorrect or insufficient lubrication—are some of the adverse factors that are often encountered.

As so much steel is required to provide the sinews of war, it is obvious that the more hours of work that can be had from every pound of wire rope used, the more steel—and time—will be saved. Let us make every saving possible of these two vital items, so that our fighting forces will have plenty to fight with, and when needed.

For further information on the proper use, care and application of wire rope, as well as regarding any wire rope problem that you have . . . feel free to consult our Engineering Department.

A. LESCHEN & SONS ROPE CO.

WIRE ROPE MAKERS

5909 KENNERLY AVENUE

NEW YORK 90 West Street
CHICAGO 810 W. Washington Blvd.
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ESTABLISHED 1857

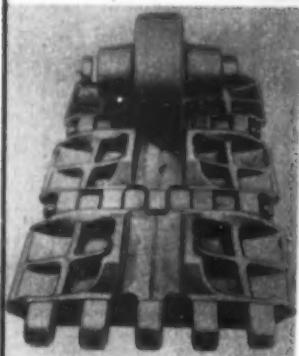
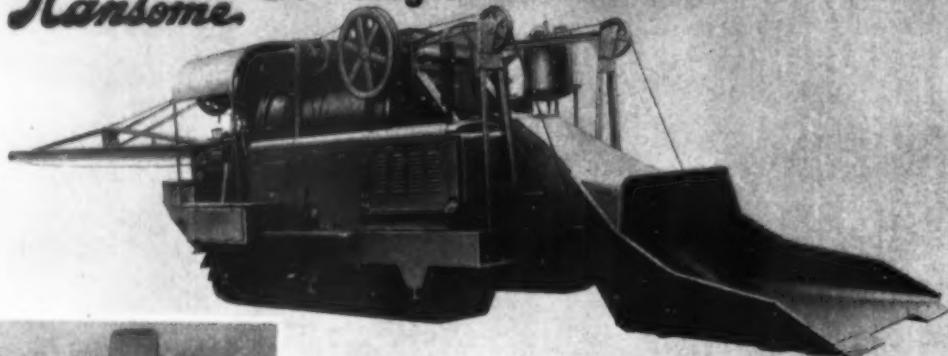
ST. LOUIS, MISSOURI, U. S. A.

SAN FRANCISCO 520 Fourth Street
PORTLAND 914 N. W. 14th Avenue
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Ransome.

34E Single and Dual Drum Pavers



High carbon heat-treated, oil-quenched electric steel crawler shoes for long wear.



Advantages of Ransome Crawlers . . .

- Long crawler (with 13 rollers) permits low ground pressure without sacrificing weight.
- Narrow overall width of crawlers for working outside of forms or on 10 to 11 ft. shoulders.
- Crawler drive chain conservatively rated (112,000 lb. breaking point).
- 13 crawler rollers with 2 7/16" shaft have .3 1/8" bearing surface on pads.
- Use of 3 crawler frame axles permits equal distribution of weight on crawlers and prevents frame distortion.
- Adjustable outboard bearing prevents strain on crawler shoes, drive chain and sprockets.

RANSOME

MACHINERY COMPANY
Dunellen New Jersey

Level Monolithic Roof and Floor Forms Faster!



Simplex Screw Jacks lift, lower and support faster and safer on construction jobs. Leveling of forms is aided by floating cap (up to 9° float). Tough malleable bases — safety peep-hole prevents over-extension. 15 sizes with ratchet head; 27 sizes with 4-hole head.

Templeton, Kenly & Co.
Chicago, Ill.

Better, Safer Construction Jacks
Since 1899



Simplex
LEVER SCREW HYDRAULIC
Jacks

Make Your Jacks Last Longer

Proper lubrication, care and handling will do it. Send for bulletin on care of jacks.

(Continued from page 112)

tersections on the west half of the project. Where clay was encountered at seven intersections on the east half of the 11-mi. section, tractor scrapers were utilized only until the excavation reached the clay stratum, and the remaining excavation, consisting of cohesive blue clay, was removed with draglines. The tractor-scrapers hauled the excavated material out of the cuts into the highway embankment; clay was loaded by the draglines into trucks.

Expressway Paving

As many as seven paving mixers were in operation at one time by the six expressway grading and paving contractors, whose jobs involved a total of more than 400,000 sq.yd of non-reinforced, uniform-thickness slab. Types of pavers in use varied from time to time, but they ordinarily were about equally divided between 27E single-drum machines and 34E dual-drum units. Most of the contractors operated a single paver, but one firm employed two mixers, a 34E and a 27E. The pavers were supplied with batch materials by trucks hauling from batching plants set up near the sections being paved. All materials, both aggregates and bulk cement, were delivered to the batching plants by truck.

When sufficient trucks were available to haul to the mixers, a 27E paver utilizing the allowable 10 percent overcharge and operating on straight runs of 24-ft. pavement 9 in. thick, could complete more than 860 lin. ft. in a 12-hr. day. Because of limitations in the sizes of batch trucks hauling to the larger mixers, the 34E dual-drum pavers were able to exceed this progress by only about 25 percent. Mixing batches of 34.36 to 36.75 cu. ft. in volume, the 34E machines completed 1,075 to 1,150 lin. ft. a day. These figures represent high runs for the project.

Because of many items involved in the road contracts, the paving jobs could not be set up for consistently high production. In a 45-day period, a 27E paver using a 31.1-cu.ft. batch averaged 730 lin. ft. of 9-in. pavement 24 ft. wide per 10-hr. day. Limitations on both the number and size of trucks held the larger 34E mixers to an average only about 6 percent greater. The actual average run for a 20-day period with a 34E dual-drum mixing a 34.36-cu.ft. batch was 771 lin. ft. per 10-hr. day.

Contractors used both tank trucks and pipe lines for water delivery. The choice of method depended partly upon job conditions and partly upon availability of equipment. Tank trucks were preferred where paving

(Continued on page 118)



A WAR PROJECT PIPELINE TO BE LAID----IN A HURRY!

MICHIGAN CRANES -- Always "ready and waiting" -- never waited upon. In this scene the Michigan has previously placed into stock pile, from railroad siding, the cast iron pipe now being loaded on to truck for delivery to job site -- but that's only HALF the story! The completely mobile Michigan will "be there" when the truck arrives ready to unload and "set" the pipe in the trench at the field.

One crane serving both ends of the job -- not a minute lost. That's mobility! . . Borchert-Ingersoll Co., MICHIGAN dealers, know construction equipment -- that's why they recommend and placed three Michigan Tamden-Drive Cranes on this vital war project where "time saved" is the all important issue.



POZZOLITH solves...

CEMENT DISPERSION

GIEB, LA ROCHE, DAHL AND CHAPPELL
ARCHITECTS-ENGINEERS
TEXAS BANK BUILDING
DALLAS, TEXAS

OFFICES
DALLAS, TEXAS
TEXARKANA, TEXAS

M. B. GIEB
E. B. LA ROCHE
GEO. L. DAHL
F. W. CHAPPELL

Fiegel's Construction Company
Minneapolis, Minn.

November 28, 1942

Gentlemen:

In answer to your inquiry, I am glad to give you the following information regarding our experience with admixtures at the _____ Ordnance Depot.

We were confronted with the problem of pouring a great deal of concrete under difficult conditions. The aggregate contained large stones yet we had very close limits of clearances due to placing reinforcement to the bottom and top forms of the "igloos".

It was important that we secure a mix which would flow freely from the chutes into the forms around the reinforcement without segregation; which would produce dense concrete free of voids and honeycombs; and which was economical.

After a number of laboratory tests, we found that by using Pozzolith in a four-sack mix we could get the 3000 lbs. of compressive strength needed, in addition to meeting the requirements on placeability and density. The reduced cement content of four sacks enabled us to maintain an economic balance of cost.

Due to the fact that the required strength was arrived at in less than normal time, we were able to speed up the operation and effect an ultimate savings. This was substantiated by facts and figures and approved by the Area Engineer.

Very truly yours,

GIEB, LA ROCHE, DAHL AND CHAPPELL

By

George L. Dahl

GLD:LA



MASTER

....Tough Placing Problem...

SPEEDS JOB... SAVES MONEY...

writes Architect-Engineer



This large Ordnance Plant is typical of the 41 great defense projects in which Pozzolith has been used with amazing results. In one depot 150 "Igloos" were built in the record time of 14 days!

HERE were four important requirements to meet — easy placing under extremely difficult conditions . . . dense, watertight concrete free from segregation defects . . . low total materials cost . . . and speed.

With a reputation for employing progressive methods, this architect-engineer investigated Pozzolith, and as a result of laboratory tests decided that here was the answer to their problem.

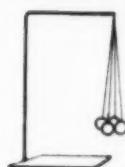
Pozzolith is not an admixture in its essential action . . . its primary purpose being to disperse the clumps of cement particles which tend to form in every mix. Millions of yards of Pozzolith concrete prove that this action (Cement Dispersion) greatly increases cement efficiency and measurably improves all concrete properties.

Write for illustrated booklet showing how Pozzolith can be used to advantage on your jobs, and Research Papers No. 36 — "Economics of Cement Dispersion" (for mass concrete) and No. 39 — "Cement Dispersion and Air Entrainment" (for runways and pavement).

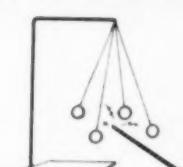
THE MASTER BUILDERS COMPANY
CLEVELAND, OHIO TORONTO, ONTARIO

WHY POZZOLITH

The Cement Dispersing Agent
IMPROVES ALL CONCRETE PROPERTIES



"Flocculated"



Dispersed

Remember in physics how a group of suspended pith-balls would fly apart when given the same electrostatic charge?



Flocculated



Dispersed

Remember also in your experiments with cement how individual particles attract each other and bunch together in water? When Pozzolith is added to cement in water, these particles are separated by the same electric force that makes the pith-balls repel each other.

This Dispersion of Cement produces two important effects:

First, since the efficiency of all cement is directly related to the completeness of hydration, more of the cement is put to work through Cement Dispersion which exposes much greater surface area of the cement particles to water.

Second, when Pozzolith is used in a mix, cement particles are separated and excess water is not entrapped. As the result, mixes with very low water content are made plastic and workable. Slump or workability is increased up to 150% when Pozzolith is used without altering the water content of the mix.

BUILDERS



SYNTRON

REG. TRADE MARK

ELECTRIC HAMMERS



Save You Money and Time CUTTING — BUSHING DRILLING

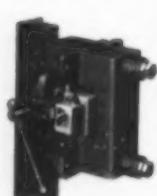
In concrete and masonry. SPEED UP those time and labor consuming jobs with SYNTRON'S 3600 powerful, heavy blows per minute.

Pulsating

CONCRETE FORM VIBRATORS



Save Concrete — Speed Up Placing and Setting



On wall forms — pipe forms — as vibrating screeds — also for bolting to bins, hoppers and chutes to provide a fast, free flow of sand, cement, aggregate, etc.

New complete Catalog #430 now available

SYNTRON CO. 500 LEXINGTON AVE.
HOMER CITY, PA.

(Continued from page 114)

runs were broken up by frequent moves of the mixers, and they were used also on straight runs by contractors who happened to own tank trucks.

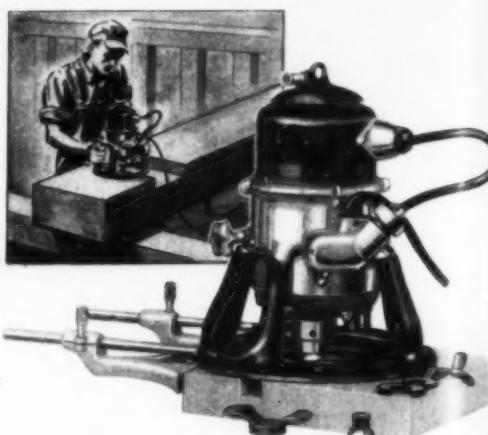
Accompanying photographs illustrate typical paving operations. Sand subgrade was struck off by subgrading machines which rode on the steel forms. To assure a solid support for the forms, soil under the bottom flange was compacted with mechanical tampers. Pavers sometimes traveled outside the form line and sometimes between the forms. Behind each paver, a two-screed finishing machine struck off the concrete. The finisher was followed by a mechanical longitudinal float, whenever a machine of this type could be obtained. Self-propelled joint machines traveling on the steel forms installed the longitudinal center line and transverse contraction joints.

During the regular paving season, all concrete pavement was cured with liquid transparent membrane sealing compound which was sprayed on the surface behind the finishers as soon as all free water had disappeared. The liquid compound contained a magenta dye which served to mark the covered portions of the pavement during the spraying process but faded out during the next 4 to 8 hr. After Oct. 1, the pavement was cured and protected from freezing by coverings of straw ranging from 6 to 24 in., depending on air temperatures.

Concrete Bridges

Dual bridges for the divided roadways of the expressway were constructed at nine places, and a single bridge was erected to carry one roadway over the connecting highway at the western terminus of the 11-mi. section. A separate contract was awarded for the bridge or bridges at each grade separation. The bridge jobs went to seven different contractors, one of whom was the successful bidder on three contracts and another on two.

Details of a typical bridge are indicated by an accompanying drawing. A contract for two bridges of this type at one location was bid in for a little more than \$88,000. At three locations where the expressway crosses divided highways, the grade-separation bridges are four-span structures with center piers between the separated roadways of the intersecting routes. Typical span lengths for one of these bridges are 40 ft. for the inner spans and slightly less than 30 ft. for the end spans. Four-span bridges crossing an intersecting highway and railroad at one location ap-



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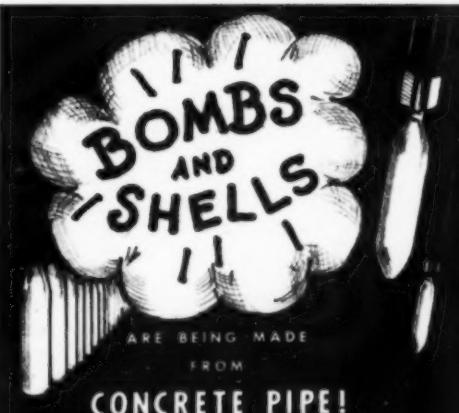
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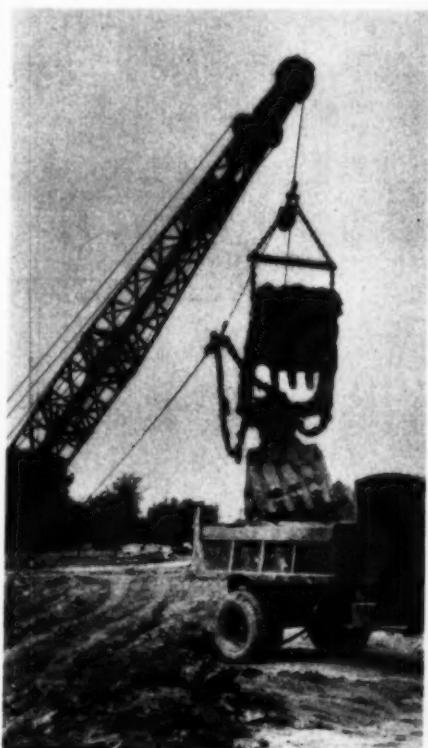
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pear in an accompanying photograph. These two bridges, which have an overall length of 229 ft. with two main spans of 69 ft. each, were built under a \$235,000 contract.

Except for four bridges at two locations where pile foundations were required, the footings of the bridges rest on sand-gravel or clay. Where the footings were built in clay, the contractors excavated the stiff, cohesive material with clay knives and clay spades to the shape and dimensions of the footings and placed the concrete in these excavated boxes. Accompanying photographs show the method of excavating for footings in clay.

Groundwater was a real problem at only one grade separation, where footings for the dual bridges had to be carried down about 6 ft. below water level in wood-sheeted pits. Wellpoints and pumps held down the water level at this location to permit concreting of the bridge footings on a dry sand-gravel foundation.



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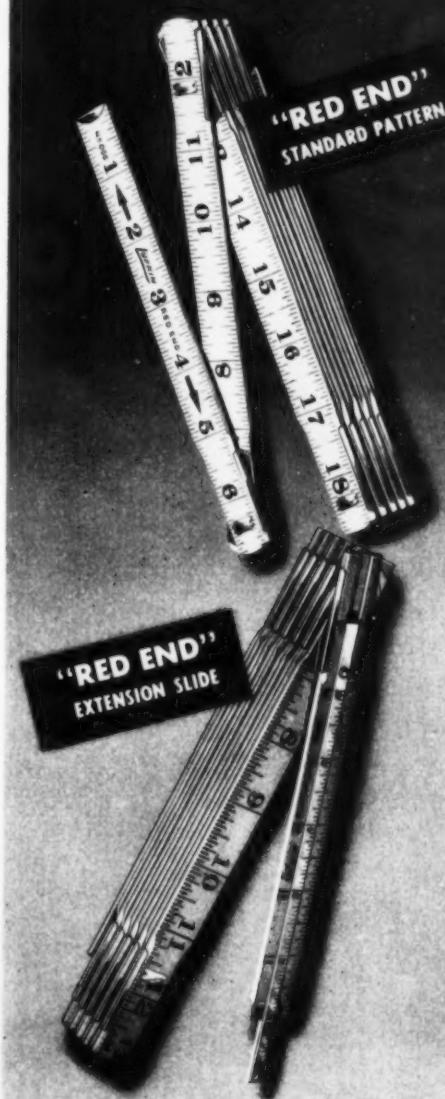
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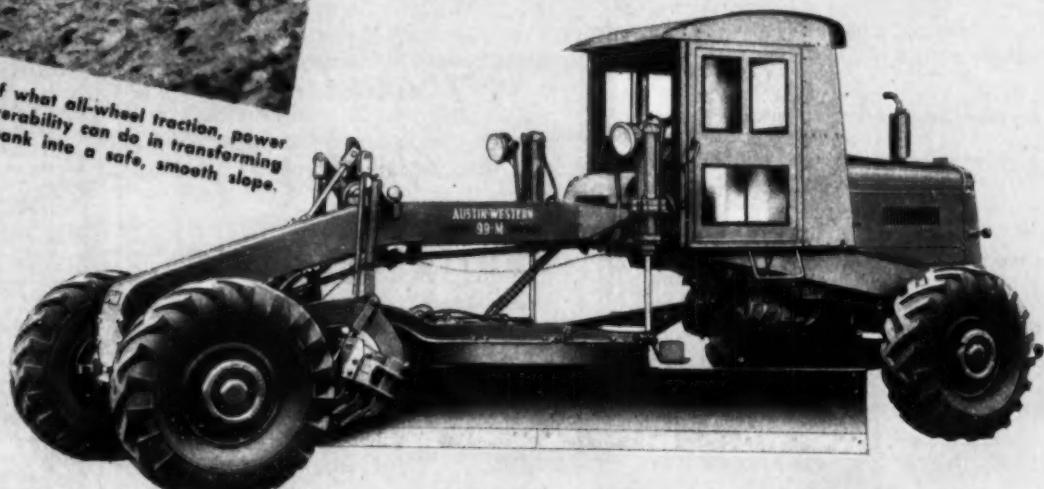
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B-P



(Continued from page 119)

forms, the contractors at all locations drove wood falsework piles. With the exception of one contractor, holder of three contracts for six bridges, who used paving mixers at the site to mix the concrete for his structures, all the bridge builders employed truck mixers to deliver concrete to the forms.

Direction

Contractors who participated in the rapid construction of the 11-mi. section of the Detroit Industrial Expressway are named in an accompanying table. For the Michigan Highway Department, G. Donald Kennedy was state highway commissioner until Dec. 30 (succeeded by Lloyd B. Reid), Harry C. Coons is deputy commissioner and chief engineer, and John G. Schaub is assistant chief engineer in charge of construction. Immediate supervision of the work on the Detroit Industrial Expressway for the state highway department was the responsibility of J. H. McCarthy, metropolitan engineer, until he entered the Army at the end of November. Operations on the project have been directed throughout by C. H. Brown, assistant metropolitan engineer, and A. J. Rousseau, engineer in charge of bridge construction.

All pavement was completed before the end of the year 1942 for use of the expressway by traffic. Because of the large amount of unfavorable weather, priority delays and shortage of labor, final completion dates for cleanup and incidental items were extended to July 1, 1943.

★ ★ ★

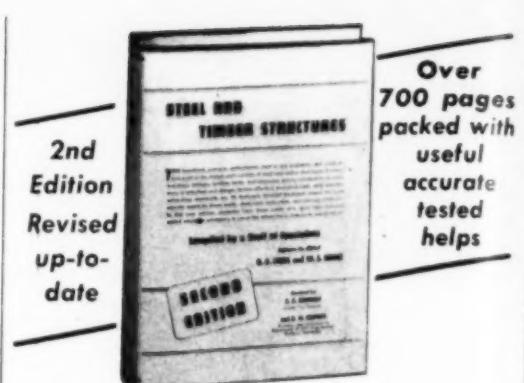
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Build Concrete Roof Arches

(Continued from page 48)

roof arches are stiffened by transverse concrete ribs on the under side, is the reduction in the amount of war-critical steel reinforcement to an amount of about one-half prewar requirements for a structure of this type.

The mass construction line, in this instance, is a series of mobile roof



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According to Fred G. Dawson, general manager, construction of the plant is right on schedule.



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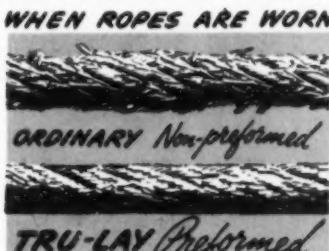
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